From: Neil Argent
Sent: Wednesday, 20 September 2017 2:59 PM
To: Jenelle Moore
Subject: Inquiry into regional development: answers to Committee questions

Dear Jenelle

In this email I seek to respond to the Standing Committee's two questions raised with me during the hearing in Armidale on the 29th August 2017.

The Hon. MICK VEITCH: Professor Argent, has there been much modelling of the migration of people west of the Great Dividing Range to the east of the range, not just to Sydney? How rapidly is that happening over the years? What are the demographics of the people moving? Is there anything the Committee can access to see what modelling has been done?

The Hon. MICK VEITCH: Is there anything the Committee should take on board to recommend to the Government about longer-term strategies to deal with those structural problems?

In response to both questions I have placed a folder in Dropbox containing some refereed journal articles and a book chapter and a recent report completed for the NSW Demography Unit, Industry and Investment. Please do not hesitate to get in contact if you would like further information or if you have any questions about these materials or the research underlying them.

Yours sincerely

Dr Neil Argent

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Neil Argent
BA (Hons. I), PhD (Adelaide)
Professor of Human Geography
Division of Geography and Planning
University of New England
Armidale NSW 2351 Australia

www.une.edu.au

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Martin Bell
Editors

Demography for Planning and Policy: Australian Case Studies

Editors
Tom Wilson
Northern Institute
Charles Darwin University
Darwin, NT, Australia

Martin Bell
Queensland Centre for Population Research,
School of Geography, Planning
and Environmental Management
The University of Queensland
Brisbane, QLD, Australia

Elin Charles-Edwards
Queensland Centre for Population Research,
School of Geography, Planning
and Environmental Management
The University of Queensland
Brisbane, QLD, Australia

ISSN 2352-376X ISSN 2352-3778 (electronic)
Applied Demography Series
ISBN 978-3-319-22134-2 ISBN 978-3-319-22135-9 (eBook)
DOI 10.1007/978-3-319-22135-9

Library of Congress Control Number: 2015957250

Springer Cham Heidelberg New York Dordrecht London

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media (www.springer.com)

Foreword

As the first book to provide a look at the broad range of potential demographic applications in Australia, this volume fills a long-standing gap and does so very admirably. The ten substantive chapters along with the Introduction show that demographers in Australia are using demographic data, methods, and perspectives to help solve important issues in both the public and private sectors. Assembling these studies in a single location is a great service to Australians.

While these chapters represent case studies in Australia, the methods and perspectives described in them can be profitably used in many other countries. In this sense, the book can be viewed as an update to the collection of case studies assembled over 20 years ago by Kintner et al. (1994) that focused on applied demography in the United States. Taken together, both books provide not only an international perspective but also a glimpse at the evolution of applied demography over time; importantly, they also show the commonalities in methods and perspectives found among applied demographers across more than 20 years and several thousand miles. In terms of the evolution of applied demography, Chap. 9 (Bell and Cooper) is an example of how far spatial demography has come since the work by Kintner et al. (1994). A similar perspective is provided in Chap. 10 (Tang et al.).

In terms of commonalities, the main links between Kintner et al. (1994) and the current volume are found in the areas of population estimation and forecasting. The computer platforms, software, internet services, and data access are very different now than what was found 20 years ago, and the ability to generate estimates and forecasts of populations reflects these changes as can be seen in Chaps. 3 (Charles-Edwards), 4 (Wilson), and 7 (Pullar et al.). However, underlying these new developments are demographic perspectives and methods that have not changed much. Another common area is the use of demographic information by governmental entities to allocate resources. The description provided in Chap. 2 (Corr) may vary in the details, but the general framework is very similar to that found in the United States 20 years ago and today.

In addition to common perspectives and methods found between applied demographers currently practicing in Australia and elsewhere in space and time, there is a common interest in how best to communicate demographic information to

Chapter 8
Migration and Ageing Processes in Non-metropolitan Australia: An Analysis of 30 Years of Dramatic Change

Neil Argent, Trevor Griffin, and Peter Smailes

Introduction

While the ageing of post-industrialised nation populations is an established fact, the incidence and rate of demographic ageing is almost always severest in non-metropolitan parts of the settlement system (Australian Institute of Health and Welfare (AIHW) 2007; Kirschner et al. 2006; Davis and Bartlett 2008; Stockdale 2011). In the Australian context, the relative concentration of ageing in rural regions results from the complex interactions of a small number of migration currents, all set within broader secular trends of increased longevity and declining fertility. In particular, structural ageing across rural Australia is being substantially driven, or at least heavily reinforced, by two key internal migration processes: the out-migration of the young working-aged (chiefly 20–29 year olds); and the in-migration of two contrasting post-retirement streams – local farm retirees and amenity-seeking 'tree change' and 'sea change' retiree migrants from farther flung regions, including metropolitan areas. In the first case, the net loss of younger people greatly accelerates, and accentuates, structural ageing (Davies and James 2011) while the latter migration current increases both numerical and structural ageing processes (see Han and Corcoran 2013; Smailes et al. 2014). For the bulk of non-metropolitan Australia the weaker compensatory migration currents are inadequate to replenish the loss of youth. International migration, running at historically high levels since the mid-2000s (McGuirk and Argent 2011), is a key source of demographic rejuvenation at

N. Argent (✉)
Division of Geography and Planning, University of New England, Armidale, NSW 2351, Australia
e-mail: nargent@une.edu.au

T. Griffin • P. Smailes
Department of Geography, Environment and Population, University of Adelaide, Adelaide, SA 5005, Australia
e-mail: tlcandmc@bigpond.com

T. Wilson et al. (eds.), *Demography for Planning and Policy: Australian Case Studies*, Applied Demography Series 7, DOI 10.1007/978-3-319-22135-9_8

the national level but, as has been well-documented (Hugo 2008) the vast majority of these migrants arrive and remain in the major capitals, Sydney and Melbourne. Although a number of migration programmes exist to deliver international migrants to regional areas – chiefly those on skilled temporary work visas (see Hugo 2008; Argent and Tonts 2014) – these do little to ameliorate the net loss of 'home-grown' young people.

The cumulative outcome of these processes is demographic ageing, expressed differentially at regional and local scales. The highest levels of demographic ageing – measured by the elderly's (65+) share of the population – are usually found in traditional, inland, broadacre farming-dependent regions (Davis and Bartlett 2008; Horton et al. 2010). When coupled with the chronic decline of total population numbers and associated loss of public and private services since the mid-1980s, the accelerated ageing of increasingly locationally-disadvantaged populations is creating 'hot spots' of entrenched and multiply-determined disadvantage, poverty and poor physical and mental health (Davis and Bartlett 2008).

This chapter focuses on the lower reaches of the Murray-Darling Basin (MDB hereafter) of south-eastern Australia (Fig. 8.1). Widely regarded as one of the nation's most important 'food bowls', the MDB incorporates a number of distinctive regions – the Riverland (SA), Sunraysia (Vic), and Murrumbidgee Irrigation Area (NSW) amongst others – whose agricultural bases are highly dependent on irrigation. As a contribution to the ongoing discussion of the optimal set of local and regional population planning strategies for rural Australia (Hogan et al. 2012;

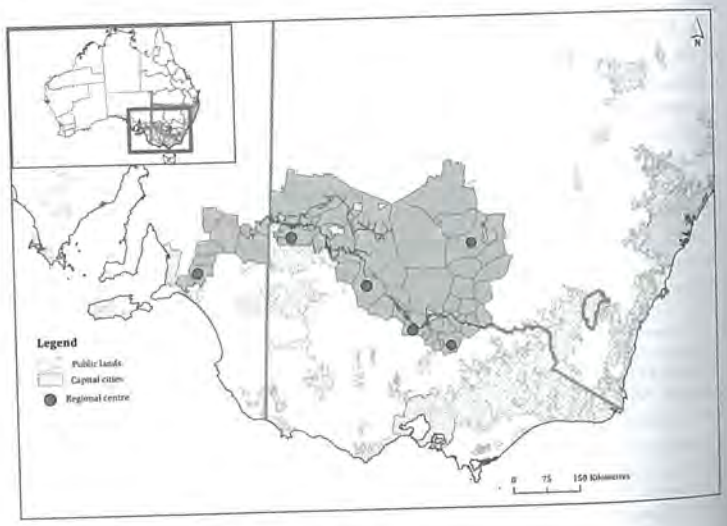

Fig. 8.1 The lower Murray-Darling Basin study area

Smailes et al. 2014), this chapter, after setting the historical context, has four central aims. First, it traces numerical population changes within the MDB study area through three decades of tumultuous climatic, regulatory, economic and social change (1981–2011). Second, two simple indices of relative ageing are introduced, applicable at a variety of scales, and designed to measure the degree to which ageing in a regional or sectoral sub-population diverges from that of the national population. Third, using these measures, the chapter seeks to demonstrate the substantial differences in the rate, nature, extent and significance of ageing within the study area at three scales of resolution within the regional settlement system. Finally, it seeks to draw out the relevance of the findings for local and regional aged care service planning. The chapter is structured in accordance with these aims.

Blooming Deserts, Blossoming Communities? The Lower MDB Case Study Area

The inland irrigation-dependent regions at the core of this study form part of a much larger study area (and socio-economic and demographic database) used by the authors to analyse social, economic and population change across south-eastern Australia since the early 1980s (Argent et al. 2005). The spatial units used are approximations of the social catchments of country towns, based on a gravity model calibrated from extensive empirical research in South Australia (Hugo et al. 2001; Smailes 2000, 2002, 2006) and then applied to the rest of the study area. Areas of overlap between social catchments have been split along median lines to give mutually exclusive and exhaustive spatial units, to which Census data at the CCD (Census Collectors' District) level were fitted, using a concordance.[1] The restricted data available for CCDs in the first censuses of the study period necessitates combination of the oldest age groups to a single 75+ bloc. The boundaries of these spatial units have been held constant over the study period; they are preferred to the census Statistical Local Areas (SLAs) which have been subject to much change over time and in many cases fail to match empirically observed social catchments. For each social catchment, for convenience frequently referred to as "communities", separate data are available for the central town itself, the dispersed rural settlement, and any subsidiary clustered settlements identifiable as separate CCDs.

All communities in which irrigated agriculture (including intensive viticulture, orcharding, horticulture as well as rice, cotton etc.) accounts for at least 25% of the value of agricultural production, and/or accounts for at least 0.5% of the total irrigation water volume used in the three study area states (2010–2011) were included, plus three small non-irrigated communities added to consolidate the shape of the study area. All are located in low rainfall areas (median 375 mm. annually) and

[1] For the 2011 Census, where CCDs were no longer used, where necessary the equivalent SA1 units were partitioned between catchments as accurately as possible, using meshblock data.

many have a nucleus of dense irrigation-based settlement surrounded by extensive areas of dry farming or pastoral country (Fig. 8.1).

Many communities owe their existence to colonial and later State Governments' ongoing experimentation with 'closer settlement' policies during the late nineteenth and early twentieth centuries. With the exception of the Chaffey Brothers' schemes around Mildura and Renmark, these were public sector initiatives, with colonial and later State governments assuming the vast majority of the financial and legal responsibility for establishing and maintaining irrigation and urban infrastructure (Williams 1975). Later, the national duty of honouring First World War servicemen formed a third strand in this policy/ideology complex, with Soldier Settlement used to populate the newly productive landscapes (Williams 1975; Powell 1988). Not surprisingly, then, many case study towns and communities are less than a century old, and date from the establishment of schemes such as the Murrumbidgee Irrigation Area.

Within a few short decades the heavy public investment in such schemes was scrutinised from increasingly critical economic and environmental perspectives, with analysts like Davidson (1969), for example, arguing that publicly-funded irrigation developments were an uneconomic use of scarce capital, given both the schemes' large sunk costs, and the substantial direct and indirect subsidies applying to many farm commodities at that time (Pigram 1988; Powell 1988). Later, as salinity – both the dryland and irrigation forms – spread its deadly tentacles across large swathes of the MDB the full environmental costs of 'watering the desert' began to be realised (Powell 1988; Lawrence and Vanclay 1992). The long-term ecological toll exacted by upstream impoundments on the downstream river ecology further strengthened policymakers' belief that wholesale changes to inland riverine management were urgently required.

Since the late 1980s, then, the study area communities' access to irrigation water has come under increasingly stringent scrutiny and control. Following the 1987 Murray-Darling Basin Agreement, genuine cross-state and Federal co-operation in water regulation led to the 2004 Council of Australian Government (COAG) framework on national water regulation: the National Water Initiative and the 2007 Water Act. The latter saw the creation of the MDB Authority and the preparation of the controversial Basin Plan, which recommended reduced extraction limits for each major irrigation region. Simultaneously, irrigation water has been permitted to be freely traded, within prescribed volume limits, across the MDB (Henderson 2015). The first Basin Plan, released in 2010, was vigorously resisted across the MDB, though it is important to note that Basin communities did not necessarily present a united front against the plan. For South Australian irrigators and their communities, forced to endure declining quantities and quality of water as the 'Millennium drought' and upstream use reduced availability, any scheme that forced more water down the Murray and into the State's suffering river systems and wetlands – including the Coorong – was welcome. Upstream of South Australia, though, concerns focused on the potentially dire consequences that proposed irrigation water cutbacks would have on farm incomes and rural communities.

Population Change Within the Lower MDB

The 54 communities in the present study area are treated as a single hierarchical level in terms of the standard daily to weekly social interactions with their respective immediate social catchments. However, they include a number of regional cities which *also* provide service functions at a higher level in the urban hierarchy, over a much wider area. Two major findings of earlier research (Smailes et al. 2014) were: (a) the very different demographic trajectories of these major communities, compared with those of the surrounding country towns; and (b) striking differences in trends in the rural as compared with the urban population elements, irrespective of community population size. This chapter tests these differential findings and their implications at the regional level. All six regional cities – Murray Bridge, Mildura, Swan Hill, Griffith, Shepparton and Echuca – anchor communities whose total populations exceeded 16,000 in 2011, while in the 48 surrounding smaller communities the median total population was just 2900. Their interquartile range was 1650 to 5900, in round figures.

In addition to their *central towns*, a number of communities possess one or more subsidiary townships, 31 of which are identifiable at every census during the 30-year period. The *rural* population consists of dispersed rural settlement and any small clusters of dwellings not separately identified by the census in 1981. Thereafter, any small cluster that by 2001 had grown to a point where it was identifiable in the census geography is still included as Rural, to maintain comparability of the four population segments (central towns and rural remainders of the 6 largest and 48 smaller communities respectively) over time.

The total population of the study area reached a value close to 360,000 by 2011, after growing 17.2% over the previous 30 years (Table 8.1), compared with a national growth of 47.6%. However, this overall increase conceals a major contrast between the urban and rural components of the communities: the 54 central towns grew by 33.6% during the 30 years, while the rural remainder declined by 7.6%. Thus, between 1981 and 2011 the central towns increased their share of the study area population from 58 to 67%, or about two thirds. Additionally, the rural decline of −7.6% (Table 8.1) certainly understates the extent of urbanisation in the study

Table 8.1 Population change in MDB case study area over the period 1981–2011 (n=54 communities)

	Central towns			Rural remainder			Study area total		
	Population ('000)		% Change	Population ('000)		% Change	Population ('000)		% Change
Communities	1981	2011	1981–2011	1981	2011	1981–2011	1981	2011	1981–2011
6 Largest	80.3	120.1	+49.6	34.9	35.4	+1.3	118.5	159.3	+34.4
48 Smaller	98.5	118.9	+20.6	81.4	72.1	−11.4	187.8	199.8	+6.4
Study Area	178.8	239.0	+33.6	116.4	107.5	−7.6	306.3	359.2	+17.2

area, because the 2011 "rural" population still includes 16 subsidiary townships that had become identifiable by that time, of which eight were functional outliers of the regional cities. Meanwhile, the 31 subsidiary settlements identifiable over the whole period (not separately shown on Table 8.1) increased their aggregate population by some 13% to reach a total of 12,600 – still only 3.5% of the study area total.

Table 8.1 also illustrates the dominant role of the 6 largest communities, based on the regional centres. These increased in size at twice the rate of the whole study area, though still slower than the national average. In fact, this value relied upon four of the six (Echuca, Mildura, Murray Bridge and Shepparton), while the other two (Griffith and Swan Hill) showed little growth. Nevertheless, in aggregate the group generated 77% of the 30-year net growth. Among the other 48 communities, although two more than doubled in size (Moama and Strathalbyn), 27 actually declined over the period. Thus the aggregate growth of the smaller communities was relatively small, held back by a substantial decline in their rural remainder.

A further characteristic of the change in population over the 30-year period was its variation over time (Table 8.2). The rate of increase for the study area as a whole declined markedly after the first 10 years, particularly across the smaller 48 communities.

The 1980s, then, were a decade of relatively robust growth, while the early 1990s to the present have been marked by fluctuating population increases. Dominating the overall growth are the regional centres, which have occasionally experienced annual average rates of growth double that of the national average. The most radical and widespread deterioration occurred in the "rural remainder" of the smaller communities, after 1991. Interestingly, the most recent intercensal period has seen substantial growth in the regional centres' hinterlands, perhaps indicating the development of some 'spillover' effects.

Spatially, aggregate population declines appear to be associated with the more broad-acre irrigation farming dependent communities, while communities that experienced net growth tend to be adjacent to the Murray, with more varied economic and employment bases that include intensive horticulture and/or tourism, retirement and lifestyle functions (Fig. 8.2).

Table 8.2 Population change in community central towns and rural components, 1981–2011 intercensal periods (percent)

	1981–1986	1986–1991	1991–1996	1996–2001	2001–2006	2006–2011
6 largest (central towns)	10.65	5.84	3.03	9.68	6.86	5.77
6 largest (rural remainder)	−4.01	2.42	3.59	−0.35	−5.30	5.40
48 smaller (central towns)	3.42	5.30	2.21	2.63	3.27	2.27
48 smaller (rural remainder)	1.19	1.72	−2.25	−1.17	−6.62	−4.20
Total study area	3.83	4.23	1.41	3.46	1.10	2.13

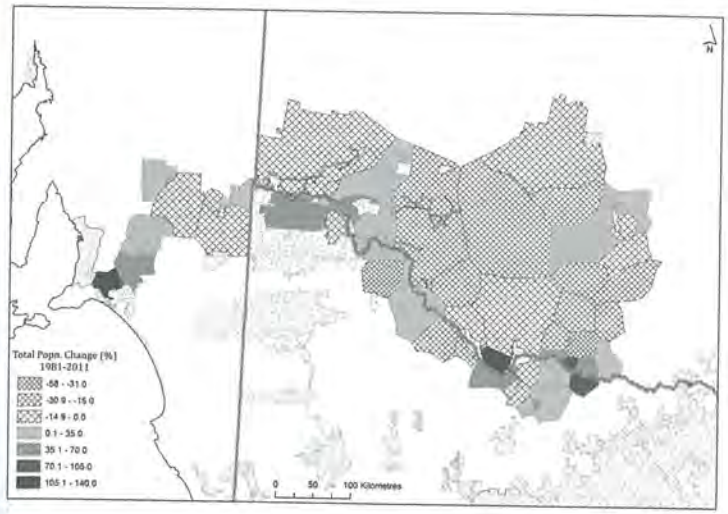

Fig. 8.2 Total population change, lower Murray-Darling Basin study area, 1981–2011

Measuring the Ageing Process

Conceptually, measures of the ageing process fall into three main categories: those that (a) compare the ageing status of two or more populations at a given point in time; (b) measure the amount or rate of ageing in a single population over time; or (c) measure the relative rates of ageing of two or more populations, where one is used as the basis for comparison. For the purposes of this chapter, a measure of type (c) is required and, accordingly, we apply a recently developed measure termed the "Relative Ageing Index" (RAI), along with a closely related measure of type (a), the Comparative Age Profile (CAP) (Smailes et al. 2014).

The RAI is a measure of the extent to which the *rate* of ageing of a region over a given period exceeds or falls short of the rate for the whole national population. The CAP on the other hand measures the extent to which the age structure of a given sub-population is "older" or "younger" than a comparator (in this case the total Australian population), at a single point in time. The rationale for these measures and their relation to other indices of ageing in use in the literature is outlined in detail elsewhere (Smailes et al. 2014). Briefly, though, the two indices have several key advantages compared with more commonly used measures (such as the proportion of the population aged 65+, or the number of persons aged 65+ per 100 aged 0-14). Most importantly, the CAP and the RAI take account (respectively) of the age status/ageing process throughout the entire age/sex pyramid, rather than just focussing on the two extremes. Secondly, as we demonstrate below, they each combine

an easily calculated overall *numerical* value for (respectively) the ageing process/agedness with the option of *graphical* depiction of the ageing (or age status) profiles throughout the age structure. Thirdly, they can take either positive values indicating relative youthfulness/ rejuvenation, or negative values for agedness or ageing. These (and other) advantages make them powerful tools for description, visualisation and analysis of the ageing process in its spatial context.

Both measures take full account of the twofold nature of the structural ageing process, in which the depletion of the younger age groups at the base of the age/sex pyramid is generally accompanied by a parallel expansion of the older age groups at the top. In the former case the main mechanism is a reduction in fertility in the female members of the child-bearing age groups, and in the latter the increased longevity of both sexes, though both of these primary mechanisms may be strongly affected (either mitigated or reinforced) by age-specific net migration flows to/from the relevant age-groups. The two processes normally act in concert, and the RAI and CAP seek first to measure, and then add together, their separate contributions in order to provide indices of ageing that apply to the entire age/sex structure. To achieve this, the age structure of the studied population(s) is first divided into two parts, separating those cohorts whose female members are in or below the reproductive age groups, from those in the post-reproductive ages. The dividing line is not immutable, but here it is set between the age groups from 0 to 44, and those of 45 and above, in line with the conventional upper limit of female fertility used in measurement of fertility rates. Ageing of a population over time is then measured by the degree of *shrinkage* in the age groups potentially capable of reproduction, plus the degree of *expansion* of the post-reproductive cohorts. In this additive approach the RAI and the CAP differ from existing ratio-based indices.

The conceptualisation and construction of the Relative Ageing Index is illustrated in Figs. 8.3 and 8.4. Initially, Fig. 8.3 compares the 1981 and 2011 age/sex pyramids for (a) Australia (left), and (b) the present study area (right). The horizontal line above the 40–44 age-group separates the cohorts whose female components are conventionally taken as potentially capable/not capable of reproduction, as outlined above. Visual comparison of the two diagrams shows that, while ageing has clearly affected both cases quite strongly, the study area has experienced a substantially greater shrinkage of the younger cohorts and a relatively greater expansion of the older ones over the 30 years, as compared to the national norm.

However, to quantify what can at best be an imprecise visual comparison of these differences, the RAI provides a numerical index through which the ageing of a target sub-population (in this case the study area) is more precisely measured against that of the comparator population (in this case Australia as a whole) over the given time period.

In constructing the index it is only the extremities of the bars representing the 5-year cohorts in Fig. 8.3a, b that are of interest, where the non-overlap of the 1981 and 2011 bars indicates change in each cohort's share of the total population over the time period. The 1986–2011 *differences* in these gains or losses as between Fig. 8.3a (the national norm) and Fig. 8.3b (the study area) are represented graphically in Fig. 8.4a, using the same horizontal scale and showing, for each cohort, the extent

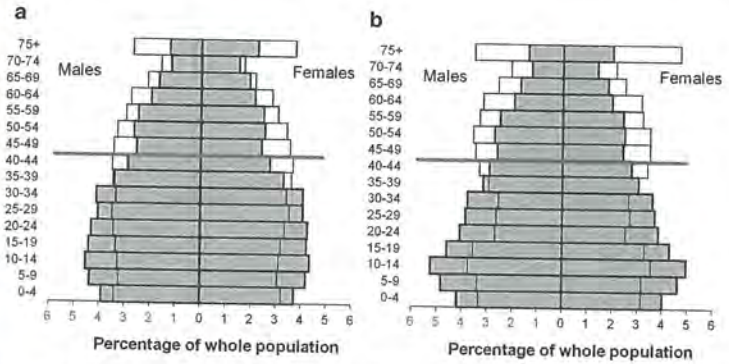

Fig. 8.3 Change from 1981 (*shaded*) to 2011 (*blank*) in the age/sex structure of: (**a**) Australia as a whole; and (**b**) the lower MDB study area

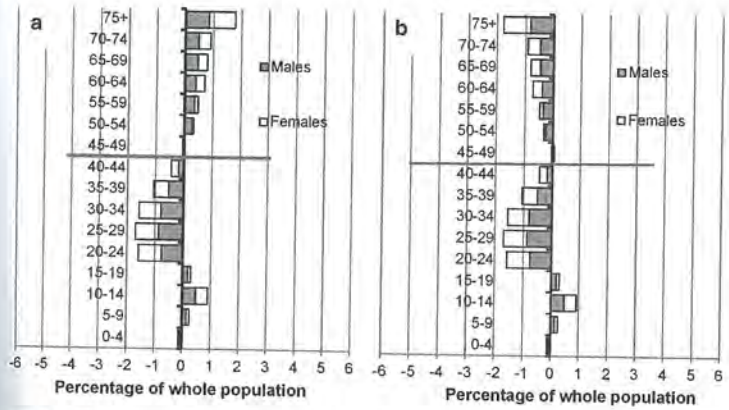

Fig. 8.4 The ageing of the lower MDB study area in comparison with that of Australia's population as a whole: (**a**) before, and (**b**) after inversion of sign for the post-reproductive age groups (Australian Bureau of Statistics (ABS) and Space-Time Research Pty. Ltd. 1990; Australian Bureau of Statistics 2012)

to which change in the study area exceeds or falls short of the equivalent change in the national population. The data and method of calculation for Fig. 8.4a, b are shown in Table 8.3. For example, the top line in the Table shows that the 75+ age groups increased nationally by 2.94% over the 30 years, whereas in the study area they increased by 4.84%, a difference of +1.9 percentage points (Table 8.3, column g; top bar, Fig. 8.4a).

Figure 8.4a, then, plots the results from column g, showing the combined male and female components of the change. For all but the first cohort from age 45

upwards, the study area has aged faster (increased more) than the national comparator. Likewise, all but one of the cohorts below the age of 45 shrank more rapidly than the national equivalents. The plot in Fig. 8.4a resembles an inverted S-shape, whose pronounced divergence from the vertical axis and very small incidence of cohorts ageing less than the national equivalents indicates a substantial relative ageing, extending almost throughout the age structure.

One further step is needed to produce the Relative Ageing Index. In Fig. 8.4a, the positive and negative deviations of each cohort from their national equivalent by definition cancel each other out, and sum to zero (see Table 8.3, column g). Therefore in Fig. 8.4b the sign of the deviations is *inverted* for all age groups above the 40–44 age cohort, such that the seven oldest age groups switch to the opposite side of the vertical axis (Table 8.3, column h). All cohorts in which ageing exceeds that of the national population, whether by shrinkage of the potentially reproductive age groups or expansion of the post-reproductive ones, now appear in Fig. 8.4b on the *same* (left, or negative) side of the vertical axis. Likewise, any cohorts which have aged less than the national comparator appear on the right, and produce a partially offsetting positive score. After this sign inversion, the ageing values for all the cohorts (+ and -) can be summed to produce a non-zero value which we have termed the RAI – in this case −10.96, where 0.00 would indicate ageing exactly keeping

Table 8.3 Calculation of the difference in rates of ageing between the study area and the entire Australian population, 1981–2011, by age group

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
	Australia			Study area				
Age group	1981 (%)	2011 (%)	Diff 81–11 [(b)−(a)]	1981 (%)	2011 (%)	Diff 81–11 [(e)−(d)]	Excess or deficit cf. to Australia (f) − (c)	After sign inversion, ages ≥45
75+	3.50	6.44	2.94	3.38	8.22	4.84	1.90	−1.90
70–74	2.71	3.29	0.58	2.63	4.20	1.57	0.99	−0.99
65–69	3.60	4.27	0.67	3.50	5.07	1.57	0.90	−0.90
60–64	4.11	5.61	1.50	3.92	6.32	2.40	0.90	−0.90
55–59	4.98	6.03	1.05	4.92	6.52	1.60	0.55	−0.55
50–54	5.20	6.73	1.53	5.19	7.05	1.86	0.33	−0.33
45–49	4.96	6.99	2.03	5.03	6.97	1.94	−0.09	0.09
40–44	5.64	7.17	1.53	5.68	6.73	1.05	−0.48	−0.48
35–39	6.70	7.07	0.37	6.22	6.02	−0.20	−0.57	−0.57
30–34	8.18	6.76	−1.42	7.38	5.20	−2.18	−0.76	−0.76
25–29	8.12	7.04	−1.08	7.56	5.34	−2.22	−1.14	−1.14
20–24	8.56	6.79	−1.77	7.91	5.22	−2.69	−0.92	−0.92
15–19	8.64	6.54	−2.10	8.89	6.84	−2.05	0.05	0.05
10–14	8.88	6.37	−2.51	10.18	7.29	−2.89	−0.38	−0.38
5–9	8.58	6.29	−2.29	9.43	6.54	−2.89	−0.60	−0.60
0–4	7.63	6.61	−1.02	8.18	6.49	−1.69	−0.67	−0.67
Total	100.00	100.00	0	100.00	100.00	0	0	−10.95

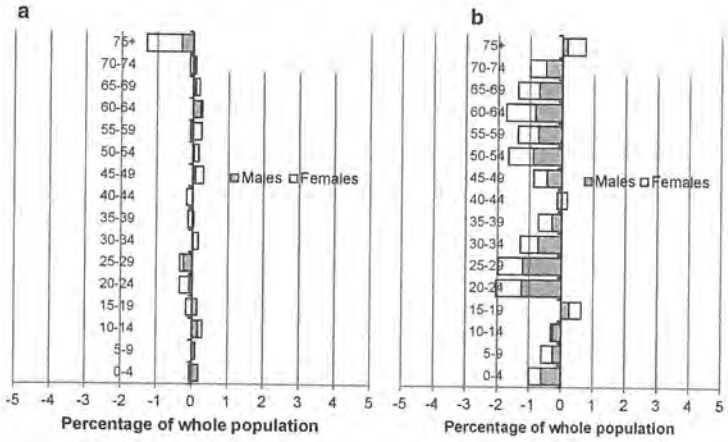

Fig. 8.5 Relative ageing profiles, six largest communities cf. to Australia as a whole, 1981–2011; (**a**) Central towns; (**b**) Rural remainder (Australian Bureau of Statistics (ABS) and Space-Time Research Pty. Ltd. 1990; Australian Bureau of Statistics 2012)

pace with that of the national population. Figure 8.5b, then, represents the study area's *relative ageing profile* for the period. Ageing is strongly consistent throughout the age structure of the study area, for almost 99% of the deviations plotted in Fig. 8.5b are negative, with very small positives in just two age groups.

To assist in interpreting the RAI value of −10.96, the units are percentage points by which net change in the age structure of the target subpopulation differs from that of Australia as a whole. The index has no fixed upper limit, but in real populations it is unlikely to ever approach ±100. Values for individual communities in the present study area range between −34.5 (very strong relative ageing) and +0.5 (very weak relative rejuvenation).

The Comparative Age Profile (CAP) is constructed in the same way as that described above for the RAI, with inversion of the sign of the differences for the 45+ age groups to produce a numerical index. In this case, however, it compares just two age profiles (the target subpopulation against Australia) at a single point in time, rather than measuring the rate of change over time. Thus the CAP gives a measure of relative age status at each census year, while the RAI measures change in relative ageing between any two censuses. For example, the CAP value for the entire study area was +1.00 in 1981, and −9.96 in 2011. The difference of −10.96 between the two equates exactly to the RAI index for the period.

Differential Ageing Across Space and Time

Central to this chapter's focus are the dynamic processes of population ageing in the lower MDB since the early 1980s, interpreted through the CAP and RAI measures outlined above. As noted, the RAI for the whole study area for the 30-year period was −10.96, and its ageing profile is shown in Fig. 8.4b. A major feature to be investigated, however, is how far the urban and rural population components differ in their contribution to the overall picture. Starting with the six communities based on regional cities, the rural and urban ageing profiles appear in Fig. 8.5.

The massive rural/urban contrast in these major communities is striking, with the regional cities themselves ageing only marginally more than the national norm, and that due only to a greater ageing in the top (75+) age groups. Even in the immediate social catchments of these regional cities, however, rural ageing exceeds the national norm almost (but not quite) throughout the age structure, with an RAI of −14.7. In the 48 communities on the next rung down in the settlement hierarchy, the urban/rural contrasts are still observable, but somewhat different (Fig. 8.6).

In these lower order communities the *rural* ageing profile is very similar to that of the six regional cities, though even more intense, with the RAI dropping to −19.4. The urban profiles for the 48 communities and the regional cities are vastly different, however, exposing far stronger evidence of ageing, almost throughout the age structure. Particularly striking is the very strong concentration in the oldest age groups in the 48 country towns, relative to Australia as a whole.[2] By contrast, in both Figs. 8.5 and 8.6 ageing among the dispersed rural population aged 75 years and more has been *less* than the national average, forming an opposing "mirror image" of trends in the towns, implying a strong sign of rural-urban retirement migration. A further common feature of the rural populations is a positive ageing in the 15–19 age group, with increasingly negative trends moving down the age structure to the 0–4 group. We return later to the impact of falling fertility on this trend.

Table 8.4 reveals a number of salient features of the lower MDB's population ageing since 1981. Firstly, ageing has been a temporally discontinuous process. The 1980s ushered in a phase of particularly rapid ageing across the study area, though least so for the six regional centres. The 1990s saw a marked slackening in the ageing process, with the regional cities producing signs of a slight rejuvenation. The final decade saw a return to more rapid ageing, with the final inter-censal period producing the highest aggregate RAI values in the entire series. Over the study period the number of communities ageing faster than the national mean also followed a similar pattern, rising to 51 of the 54 communities in the final inter-censal period. By 2011 the number of communities exhibiting age structures younger than the national standard, measured by the CAP, had declined to four: Griffith, Robinvale, Shepparton and Leeton.

[2]The compression of the oldest 5-year age groups into one, (75+), makes no difference to the RAI score, as the RAI is insensitive to the number of age groups. It will give the same value whether 1, 5, 10 or irregular age groups are used.

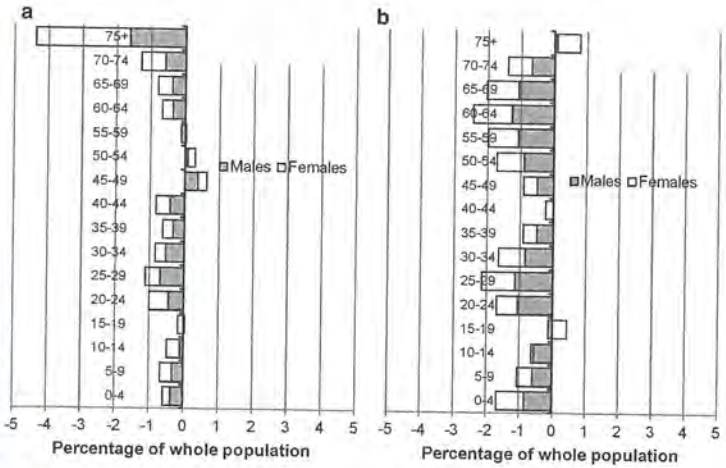

Fig. 8.6 Relative ageing profile, 48 smaller communities cf. to Australia as a whole, 1981–2011; (**a**) Central towns; (**b**) Rural remainder

Table 8.4 Relative ageing the study area, as compared with the entire Australian population, 1981–2011, by community type

	CAP	RAI						CAP
	1981	1981–1986	1986–1991	1991–1996	1996–2001	2001–2006	2006–2011	2011
6 regional centres	1.46	−1.67	−1.35	0.40	1.87	−1.47	−2.16	−2.92
48 smaller communities	0.71	−3.35	−3.23	−0.75	−1.06	−3.60	−4.29	−15.57
All 54 communities	1.00	−2.68	−2.48	−0.25	0.25	−2.59	−3.20	−9.96
Communities ageing>Aus.		45	43	36	32	48	51	

Simultaneously, the relationship between the youthfulness/elderliness and the large/small size of the community population gradually increased. As well as ageing much more slowly than the smaller communities, the aggregate population of the six regional cities experienced continuous growth over the 30 years, while that of the other 48 communities remained essentially static in aggregate over the final two decades (Tables 8.1 and 8.2). In this latter period 31 of the 48 smaller communities aged more rapidly than the Australian average. This combination of a static population and an increased rate of ageing suggests that the process involved was essentially one of intra-community 'ageing-in-situ' extending almost throughout the lower level of the settlement hierarchy. Over the study period, however, a weak

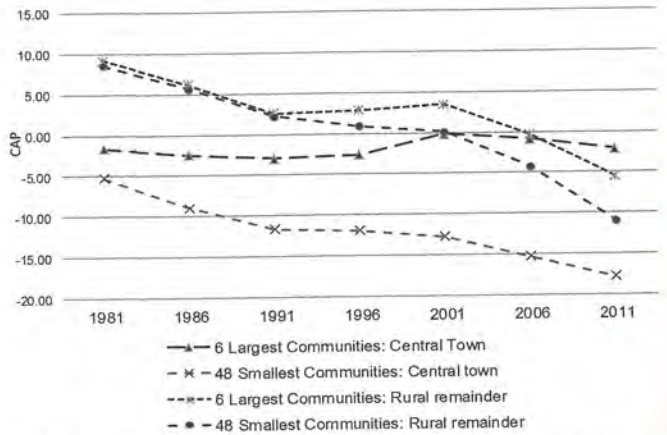

Fig. 8.7 CAP scores and RAI trends for 6 largest and 48 smallest urban and rural population components, MDB study area, 1981–2011

relationship between the CAP values and absolute population size did gradually develop among the 48 smaller communities, starting practically at zero in 1981 (Pearson's r=.03) and rising to r=.30 by 2011 – a result just significant at the .05 level of probability.

Figure 8.7 provides a graphical summary of the RAI and CAP movements for the two hierarchical levels of community, and their rural and urban components, for each intercensal period from 1981 onwards. The zero line represents the national rate of ageing. Data points indicate CAP value at each census; change between data points equates to intercensal RAI value. This figure shows that while both levels of the settlement hierarchy started the period in 1981 with a younger age structure than Australia (Table 8.4, column 1), this was due to very youthful rural age structures more than compensating for the substantially older central towns. Thereafter, by far the most dramatic ageing has been in this dispersed (essentially farm) segment of the case study population, particularly after 2001. It is notable that ageing of the rural element in the regional centre catchments, initially almost identical to that of the smaller communities, diverged after 1991 and aged more slowly than the national mean, suggesting the possibility of some rejuvenation by urban overspill. After 2001, however, the RAI of the dispersed segment of the six regional city communities deteriorated very sharply, giving the regional cities a *younger* age profile than their rural surroundings by 2011– a novel situation in rural Australia.

The second main feature of Fig. 8.7 is the increasing divergence in the *urban* ageing trends as between the regional centres and the smaller communities. Starting relatively close in 1981 with negative but very similar CAP values, by 2011 the regional centres remained close to the national norm, with a 1981–2011 RAI of only

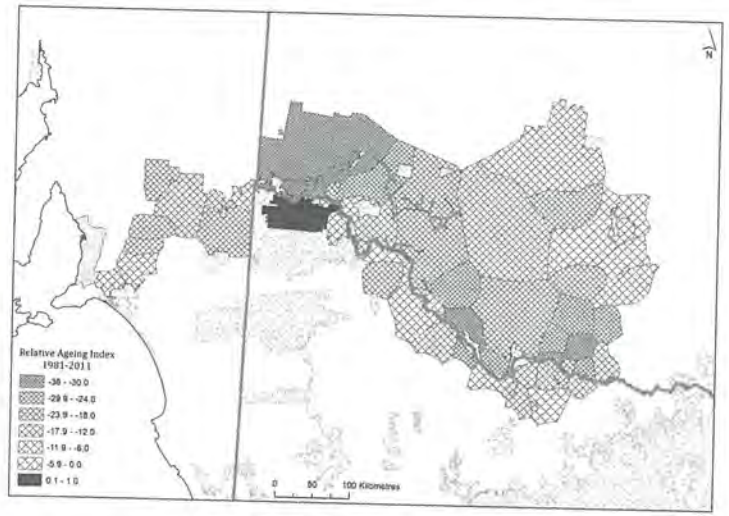

Fig. 8.8 Relative Ageing Index scores, lower Murray-Darling Basin study area, 1981–2011

−0.04, while the main towns of the 48 smallest communities fell consistently further behind with an equivalent RAI as low as −12.6. The rural component of the 48 communities aged even faster with an overall RAI of −19.4, falling rapidly behind the Australian norm after 2001, with an age structure apparently converging towards its urban counterpart. Despite our focus here on structural ageing, it should be noted that substantial numerical ageing has also occurred. Between 1981 and 2011 the study area population aged 65 and over more than doubled (from 29,000 to 63,000), while that aged 75 and over almost trebled (from 10,300 to 29,500, despite net migration losses).

To close this section, Fig. 8.8 illustrates the spatial variability of ageing within the study area at the individual community level. It shows the cumulative RAI change for each of the 54 communities over the 30 year study period. While random factors combined with small populations as well as space limitations restrict our options at this detailed level, Fig. 8.8 highlights some key points. Only one community – Mildura (with a value of +0.5) – aged more slowly than the national average. However, the six regional centres were all in the group of ten with the least relative ageing over the 30 year period. At the other end of the scale, 14 communities experienced a negative RAI value for every one of the six intercensal periods, while a further 15 communities had five negative values, and none had less than three. Overall, the ageing of the population in the study area, although extremely variable, was very much greater than the Australian average.

In summary, then, the lower MDB's regional centres and their hinterlands underwent a relatively gradual process of ageing from 1981 to 2011, though the rate of increase has been felt most acutely in the rural areas. By the 2011 Census, the six regional centres and their communities exhibited the youngest age structures across the study area, with their dispersed populations not too far behind. For the 48 communities further down the regional urban hierarchy, and despite commencing the study period with marginally younger populations than the nation as a whole, the subsequent 30 years brought rapid and sustained increases in ageing. The 48 smaller community central towns in aggregate have aged only slightly less than their rural catchments, registering an RAI score of -12.58 for the three decades. While undergoing dramatic ageing over the study period, the rural hinterlands of these 48 communities still ended the period with younger populations than their central towns. Nevertheless it appears that the farm sector's long-held position as an incubator of regional populations and net donor to the remainder of the national settlement system is under serious threat. The chapter now considers the possible causal factors underlying these processes.

Drivers of Ageing Processes in the Lower MDB

Critical to the future demographic, economic and social vitality and viability of the study area communities is their capacities for regeneration via local births and/or in-migration of young families. In seeking explanation for the acute ageing described above, we commence with fertility changes since any sustained secular downturn in fertility must needs lead to structural ageing as successively smaller cohorts move up the age pyramid. Figure 8.9 demonstrates trends in the General Fertility Rate (children aged 0–4 per 100 women aged 15–44) in the study area.

Although higher than the national rate for the whole period, the general fertility rate reached a peak in 1996. After 1996, however, the fertility rate fell sharply for 10 years, especially for the rural population, with a slight recovery by the 2011 census in line with the national trend. Children aged 0–4 in 1996 were aged 15–19 by 2011. If the timing of this fertility decline is compared with the ageing profiles in Figs. 8.5 and 8.6, it will be seen that the 15–19 age cohort was the last one with a positive RAI, with the successively younger cohorts becoming more and more negative. It appears highly likely that structural ageing at this end of the age pyramid is at least partly impacted by fertility decline, especially for the rural population. In 1981 the dispersed population's general fertility rate was over five percentage points higher than that of the community centres; by 2011 this relationship had become inverted with the regional cities and smaller towns exhibiting slightly higher fertility than the farming areas.

However, in most Australian rural communities, structural ageing is also strongly driven by net youth migration loss, supplemented by aged net migration gain and 'ageing-in-situ'. Of course, where heavy net youth migration loss is sustained the capacity of a community to replenish itself via natural increase (i.e. excess of fertility over mortality) can be undermined. To test this contention, Figs. 8.10 and 8.11

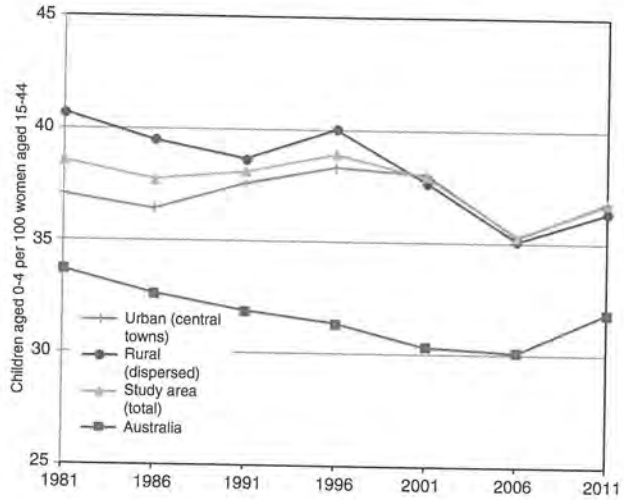

Fig. 8.9 Change in the General Fertility Rate, 1981–2011, total study area and Australia

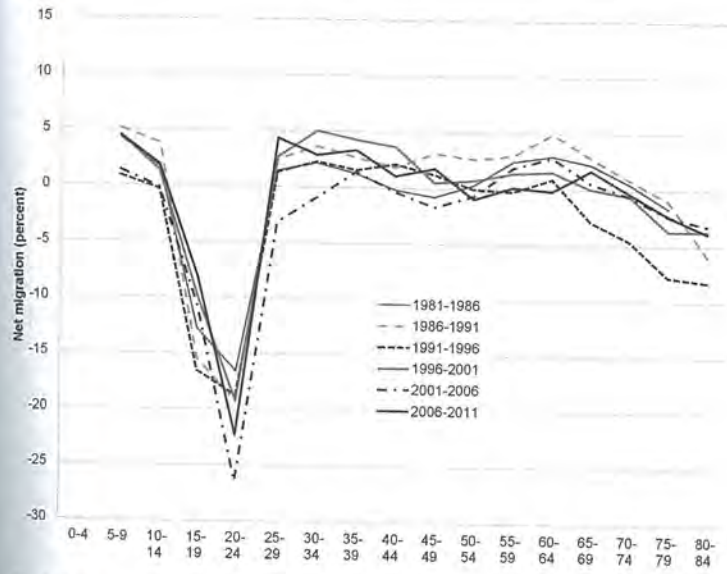

Fig. 8.10 Age-specific net migration profile, 1981–2011, total study area, males

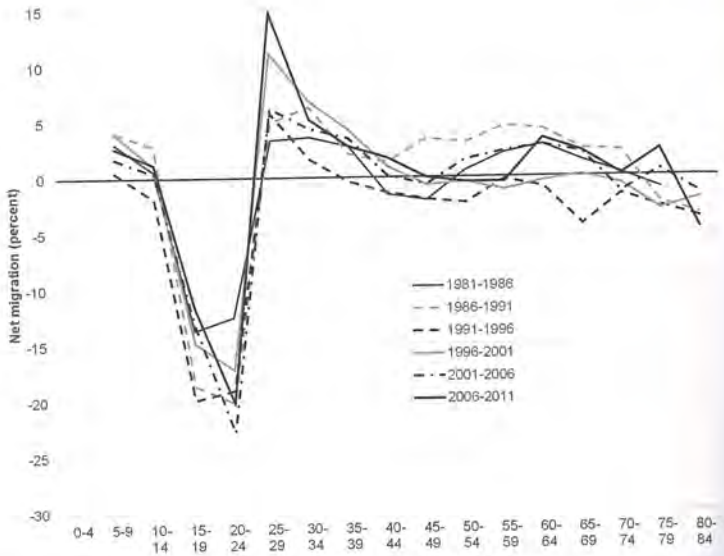

Fig. 8.11 Age-specific net migration profile, 1981–2011, total study area, females

show net migration rates for males and females, respectively, within the MDB study area from 1981 to 2011. The peaks and troughs of the age-specific estimated net migration profiles show heavy losses in the school leaver, higher education and first job seeker 15–19 and 20–24 cohorts, and net in-migration in the middle to older working age of families with young children, as are typically found in rural Australia (Argent and Walmsley 2008; Davies 2008). Here however, the trough in the 15–19 and 20–24 age groups is extremely deep, the impact reaching its nadir in 2001–2006 with a net loss of over 9000 persons, or almost a quarter of the 2001 total. Male net out-migration in the 25–29 and middle working age groups also increased in the same period, which witnessed the severe and protracted 'Millennium drought', associated cuts in irrigation outtakes, and ongoing cost/price pressures in key horticulture sectors such as viticulture and citrus. This decade also saw large numbers of men – and to a lesser extent, women – leave farming regions across the nation to take up highly remunerative work in the booming Queensland and Western Australian mineral and energy extraction sectors.

Beyond the youth and young adult cohorts, meagre net migration gains were indicated for most cohorts and for most intercensal periods. However, two further trends stand out: (1) the somewhat predictable net migration loss of the elderly (70+); and (2) a pronounced net migration gain in the 25–29 age group. Importantly, this 'rebound' is especially marked for women and, although fluctuating, appears to

have increased over time. This would appear to be evidence of a return migration current; one that, if sustained, could provide a valuable counter to the chronic ageing processes outlined in this chapter (Jarvie and McKay 1993).

Policy and Planning Implications and Conclusions

The foregoing analysis reveals that one of Australia's most important 'food bowls' is rapidly ageing, simultaneous with increasing urbanisation of the regional settlement system and the ongoing re-interpretation of the MDB's resources. However, this has been a temporally and spatially uneven process: the major regional centres have generally experienced relatively rapid population growth and, relative to the broader study area, below average ageing. Smaller communities, characterised by smaller service centres and their farming hinterlands, on the other hand, have generally experienced very rapid ageing, particularly over the last decade. Our previously cited research over a broader area of south eastern Australia advocated a twofold strategy: the first constructive, to ensure an integrated, cooperative economic future for both levels of the settlement hierarchy, and the second ameliorative, to confront the social costs of an ageing process already substantially ahead of the national norm. We focus here on the latter aspect.

The CAP and RAI used in this chapter provide a simple means by which the ageing trajectories of sub-regional populations may be measured over time and space. Also, because changing age-sex structures are central to the CAP and RAI's calculation, proximal causes (and possible solutions) for the specific ageing process under investigation can be suggested. Structural ageing, driven primarily by net youth migration loss but also augmented by fertility decline, ongoing age-selective 'amenity-led' pre- and early post retiree in-migration and ageing-in-place, appear as the chief drivers. In relation to appropriate policy and planning measures, based on our analyses we advocate a socio-spatially nuanced strategy which recognises that the needs of the rural aged and those of the (essentially place–based) communities in which they choose (or are forced by circumstance) to live, are inextricably intertwined (Feist et al. 2011; Hugo et al. 2012). As demonstrated above, the 48 smaller rural communities and their main centres experienced some of the fastest rates of ageing in the study area, and many contain highly concentrated aged populations. The severe ageing of the rural population revealed by this chapter also highlights a potential threat to the family farming sector once at the centre of the 'closer settlement' policies that originally brought regions like the MIA into being. In regions and localities hard-hit by long-running restructuring processes, involving, *inter alia*, chronic and severe population decline, public and private service and industry closures, life for the elderly can be difficult (e.g. Halseth and Hanlon 2005; Stockdale 2011; Milbourne 2012) . By contrast, for the aged living in the six regional centres of the lower MDB, access to vital health and related services is unlikely to constitute a major problem given State and Federal Governments' concerns to regionalise a host of key public services, including health and aged care. Complementing this

strategic approach at the local scale is a combination of private mobility and public community transport agencies seeking, to encourage individual and/or community mobility for hinterland residents.

However, the ageing residents of towns and rural areas outside the regional centres potentially face more problematic futures in the absence of remedial planning action for this order of the settlement hierarchy, as advocated above. Following decades of population decline and public and private sector service withdrawal, many now lack anything but the most basic health and aged care services. For some of the smaller centres even General Practitioner services are provided only on a part-time, visiting basis. The capacity of elderly residents of these lower tier centres to move to access better quality care – either in the metropolitan areas or more nearby regional centres – can be checked by the near dormant state of local real estate markets, hampering the ability of residents to liquidate local housing assets. Yet the current level and nature of aged care provision across much of rural Australia is predicated on the elderly's mobility. Local and regional development strategies to help revitalise the economies of this tier are vitally needed to bolster local populations, services and their vital socio-cultural functions.

Notwithstanding the rather generic manner in which we have discussed the 'aged' in this chapter, it is vital to appreciate that the current and future elderly cohorts are not homogenous, in terms of socio-economic status, health, current and preferred place of residence, etc. (Davis and Bartlett 2008; Milbourne 2012). There can be no 'one-size-fits-all' approach to planning for the rural aged. The 'baby boomers' – the first wave of whom has joined the ranks of the 'young-old' – enjoyed the prosperity of the 'Long Boom' and a series of major advances in public health care. They and subsequent waves have benefited substantially from ongoing improvements in longevity, and it can be expected that a high proportion will enjoy good health well into their post-retirement years. This may mean that current and future generations of the rural elderly will continue to maintain some connection to the workforce and require comparatively little health care support. The rural aged also frequently play fundamental roles in sustaining the economic, social and cultural lives of rural communities (Chalmers and Joseph 1998; Winterton and Warburton 2012). In part, this is due to many rural aged people's strong attachment to place; a bond that for some has been forged over a lifetime (Stockdale 2011; Milbourne 2012; Winterton and Warburton 2012). Therefore, 'ageing-in-place' can provide fulfilling experiences, both for the individual and the broader place-based social unit to which he/she belongs.

There is also a growing anxiety that, with the increasing incidence of chronic poor health conditions, such as arthritis, dementia and Alzheimer's disease, in the Australian population, increased longevity may be outpacing healthy life expectancy (Stockdale 2011). As should be obvious from the above, managing the chronic conditions of ageing will likely be much more difficult outside the regional centres due mainly to the thin spread of relevant services in non-metropolitan Australia. The roll-out of the national broadband network (NBN) offers some hope of state-of-the-art telemedicine and chronic illness support but, again, the network's patchy coverage throughout rural Australia means that this is a hope largely unfulfilled.

In these circumstances there is genuine concern that existing spatial inequality suffered by residents of the small towns and rural hinterlands of the lower MDB could be further compounded by a complete lack, or only intermittent provision of, key services for the elderly.

Dedication This chapter is dedicated to the memory of Graeme Hugo, a dear friend and colleague.

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Chapter 9
Measuring Spatial Variations in Wellness Among Australia's Rural Aged

Martin Bell and Jim Cooper

Introduction

Among the most significant demographic changes confronting Australia, like much of the developed world, is the ageing of its population. Over the past 20 years, the proportion of the nation's population aged 65 or over has risen from 11.3 to 13.8%, and is forecast to reach 18.7% in 2031. This represents almost a doubling in the absolute number of older Australians over a 20 year period. The rate of increase in the old-old, those aged 85 and over, is even more dramatic, with numbers projected to reach 805,000 by 2031 (ABS 2013a). Demographic ageing is primarily a consequence of falling fertility, fuelled in Australia by the post-war baby boom and supplemented by massive post-war immigration, but it has also been shaped by steadily increasing longevity (McDonald 2014). With life expectancies around 80 years (ABS 2014), older Australians, on average, can now expect to have two to three decades of life beyond the traditional age of retirement (Sanderson and Scherbov 2008; Kendig 2014).

Population ageing has far-reaching implications – social, economic and political – and has triggered extensive policy debate, particularly in regard to health, income support, housing and labour supply (see Productivity Commission 2013; United Nations 2012). Budget, financial and macro-economic considerations remain at the forefront of public discourse, but there is rising recognition that the aged are a diverse and heterogeneous population, with widely varying experiences, circumstances and needs (Keating et al. 2011; Winter and Warburton 2011). Kendig (2014) argues in favour of a life-course perspective that views ageing as a variable social process in place of uniform assumptions as to age-based capacities. Equally important

M. Bell (✉) • J. Cooper
Queensland Centre for Population Research, School of Geography, Planning and Environmental Management, The University of Queensland, Brisbane, QLD 4072, Australia
e-mail: martin.bell@uq.edu.au; j.cooper4@uq.edu.au

T. Wilson et al. (eds.), *Demography for Planning and Policy: Australian Case Studies*, Applied Demography Series 7, DOI 10.1007/978-3-319-22135-9_9

Rural Youth Migration Trends in Australia: an Overview of Recent Trends and Two Inland Case Studies

NEIL ARGENT* and JIM WALMSLEY
Division of Geography and Planning, The University of New England, Armidale, NSW 2351, Australia.
**Corresponding author. Email: nargent@une.edu.au*

Received 15 February 2007; Revised 16 May 2007; Accepted 30 November 2007

Abstract
Much of what has been written on the topic of Australian rural youth migration trends and processes has often proceeded from data-free, or data-poor grounds. In this context, this paper analyses recent trends in youth (15 to 24 years of age) migration for a temporally-consistent set of Statistical Divisions (SDs) in inland rural Australia, and for local government areas within the Northern Tablelands and Slopes and Ranges of northern New South Wales and the Western Australian Central Wheatbelt. The paper finds that rates of youth loss from rural regions have increased over the past twenty years. Yet the patterns, processes, causes and impacts of rural youth migration are distributed in a spatially-uneven fashion. Some remote areas are receiving net migration gains while booming 'sea change' coastal regions have experienced heavy losses. While the 'flight to the bright city lights' syndrome is evident, relatively high proportions of young people in the Northern SD of NSW move within their immediate region. Nevertheless, some common understandings concerning youth mobility were also confirmed. Gender differentials in migration propensity between women and men are evident even at quite local scales. Young people are also more likely to search out capital cities than the rest of the population. Most inland areas still continue to experience heavy losses of local youth. A more precise understanding of rural youth migration trends is an important stepping stone in the establishment of a reinvigorated research effort into young rural people's perspectives of their changing life chances in their home communities.

KEY WORDS *rural Australia; rural youth; rural youth migration*

Introduction

Although academic and broader public concern for the future of rural communities in Australia is not new, the past decade has seen an intensified research effort into: the particular economic, political, social, health and demographic problems confronting rural society (Pritchard and McManus, 2000; Gray and Lawrence, 2001; Smailes, 1997); the spatial distribution and incidence of these maladies (Hugo, 2005; Smailes *et al.*, 2005); as well as the essentially endogenous factors that may both contribute to rural community decline as well its remediation (Cocklin and Alston, 2003; Cocklin and Dibden, 2005). Although this multi-pronged research effort has made a substantial contribution to the public's appreciation of the extent and nature of rural structural change and its human consequences, arguably it has also displayed an adult bias, being more concerned with, for example, the

doi: 10.1111/j.1745-5871.2008.00505.x

particular disadvantages to older rural people of service rationalisations. It is only in more recent work that the specific impacts of the above-mentioned changes upon young rural people – children and young adults – and their responses to these changes, have attracted concerted attention (e.g. Alston, 2004). In this paper, we argue that a deeper and more accurate understanding of rural youth and young adult migration patterns is needed. This is because much of what has been written on this topic has often proceeded from rather data-free, or at least data-poor grounds, often with a mismatch between claims made about rural youth out-migration and the data presented. We argue that this more precise understanding of the often complex trends in rural youth migration is an important stepping stone in the establishment of a reinvigorated research effort into young rural people's perspectives of their changing life chances in their home communities, which in itself is a critical first step in devising inclusive and genuinely socially sustainable rural town and community revitalisation strategies.

The present paper, in concert with similar demographic research conducted by Rudd (2006), aims to provide a clearer picture of recent rural youth migration patterns and trends. Using time series, cross-classified data from the 1976 to the 2001 Censuses, it reviews recent trends in youth (15 to 24 years of age) migration for a temporally-consistent set of regions based on Statistical Divisions in inland rural Australia, focussing especially upon the origins and destinations of the flows of rural youth, together with the relative propensity of young men and women to leave rural areas. The demographic impact upon 'sending' or origin regions is also considered. A second stage of migration analysis is conducted in the local government areas of two somewhat iconic inland rural regions – the Northern Tablelands and Slopes and Ranges of northern New South Wales and the Western Australian Central Wheatbelt. Both are somewhat typical inland farming areas, with a heavy dependence upon a mixture of livestock grazing and broadacre cropping, including irrigated cropping in the north-western portion of the northern NSW case study area. Nevertheless, the major population centres of both regions play important administrative and service functions for their hinterlands and act to broaden each region's economic base somewhat. There is growing evidence of agricultural diversification in both regions with 'niche' farming enterprises becoming popular, coupled with the increasing popularity of the most accessible towns and landscapes for tourism and rural residential development (see Tonts, 2005; Argent *et al.*, 2006). However, for those towns and areas somewhat remote from the major regional centres, ongoing population decline over the past twenty years has been the norm. In the following section, we review the recent literature on rural youth, drawing out key topics for further investigation in the succeeding empirical sections of the paper.

Rural youth migration: a summary of the evidence

Rates of migration

Australia has a high level of youth migration: 52% of all people aged 15–24 changed residence in the five years to 2001. The rate was much higher for those aged 20–24 years (64%) than for teenagers aged 15–19 years (42%) (Australian Bureau of Statistics (ABS), 2003). Overall, the age-specific migration rates for the 15–24 year olds are among the highest of any age group in the nation (Walmsley *et al.*, 2006). Moreover the migration rates for this age group increased in the twenty years leading up to the 2001 Census (Kirstein and Bandranaike, 2004). Rural youth figure prominently in these migration trends although the definition of what comprises 'rural' is sometimes problematic. For example, 'rural' is often defined in terms of what it is not, meaning that it is often equated with 'non-metropolitan', thereby including coastal as well as inland regions (Pritchard and McManus, 2000). This problem notwithstanding, a bleak media picture has been painted of rural youth migration which has been seen as embedded within a range of rural problems: '... media images of Australian regional life are overwhelmingly bleak; regional communities are dying; regional services are withdrawing; an underclass is forming; youth are disappearing; the bush has been forgotten' (Gabriel, 2002, 209). Using a case study of Ariah Park Central School in the Riverina as a microcosm of inland Australia, the *Sydney Morning Herald* examined what had happened to the Year 10 class of 1999. It transpired that 16 of the 19 students now lived elsewhere, leading the journalist in question to remark that 'an exodus of youth to the bright lights of the city has left rural Australia facing a grim future' (Lewis, 2005, 21). Particular case studies of course mask the rich complexity of what is happening in rural Australia. The picture is not one of outflows

alone. Partly countering such movements are the inflows of youth into rural areas. For instance, at the 2001 Census, of the population aged 15–24, 85 871 moved from country areas to capital cities while 29 435 moved in the opposite direction. Nevertheless, there was a substantial net loss of people aged 15–24 from country areas to cities (56 436) and to large population centres (35 051) (ABS, 2003). In order to understand these migration flows, it is important to look at the pattern of migration, the trigger factors, the effects of net out-migration, and debates about possible policy responses.

Geographical patterns of migration

In terms of pattern, the most notable feature of youth out-migration in rural Australia is probably the fact that it is a long-established phenomenon. The youth exodus has been of concern for at least seventy years (Gabriel, 2002; Tonts, 2005). The geographical pattern of migration is however complex. Although many areas of rural Australia have lost population consistently since the 1970s (Walmsley *et al.*, 2006), some areas have gained. Mining towns and areas of intensive agriculture are examples. Tourism, too, has encouraged in-migration to favoured, often coastal locations. This is part of a worldwide trend (see Garrod *et al.*, 2006). The areas which have fared worst in terms of out-migration tend to be located in western Queensland, western New South Wales, the Eyre Peninsula, and the wheat-growing areas of Western Australia (Walmsley *et al.*, 2006). In such places, towns with fewer than 2000 people have been particularly badly hit (Garnaut *et al.*, 2001). Even areas that have benefited from sea change in-migration have seen an outward movement among their youth (Drozdzewski, this volume). Traditionally, females in rural areas have been more mobile than males (Rudd, 2006) although this pattern can be subverted by massive changes in a small number of regions. This was apparently the case in the 1996–2001 intercensal period when, as a result of big net losses of young men from inland Queensland, rural men were more migratory than rural women (Walmsley *et al.*, 2006).

Gender and migration

Figure 1 highlights the disparity in the out-migration of young men and women from rural settings in Australia. It also displays regional differences in the level of overall youth out-migration. Figure 1 clearly shows that proportions of local young people leaving their rural homelands are highest – approaching and even exceeding half of the cohort population in many cases – in the drier, remoter, more agriculturally-dependent regions. For example, three quarters of women aged 15 to 24 years and over half of the same aged men moved from the Upper Great Southern Statistical Division (SD) of WA during the 1996–2001 intercensal period, followed closely in the biggest proportional cohort loss stakes by its northern neighbour, the Midlands SD, which saw over two-thirds of its young women and over half its young men leave, and the Yorke and Lower North SD of South Australia also lost two-thirds and one-half of 15–24 year old females and males respectively. Of greatest concern is the fact that the proportions of this youth cohort permanently leaving these rural regions has, in many cases, increased quite substantially over time.

The other key feature of Fig. 1 is, of course, the spatial disparities in the proportions of young men and women migrating from rural areas. Although females are, as has already been noted, more likely to leave rural regions than their male counterparts, the gender gap varies widely between regions but not always in predictable ways. For instance, while there were understandably larger proportions of young women than young men leaving the wheatbelt zones of Western Australia, South Australia, Victoria and New South Wales between 1996 and 2001, the relative propensity for women to leave rural areas is more muted in the Queensland inland. Nevertheless, the overall picture is one of an unequivocal desire on the part of a sizeable minority (and sometimes a majority) of young women to leave their rural homes, much more so than is the case for young men.

The prolonged period of youth out-migration has meant that the size of the youth population in rural areas has declined. For example, in the seven inland towns in Alston's (2004) study (Carrathool, Forbes, Hay, Leeton, Narrandera, Temora, and Tumbarumba), the number of males aged 15–19 years fell 21% between 1986 and 2001. The fall for females of the same age was 18%. The falls were even more striking for slightly older individuals: for those aged 20–24, the number of males fell 33% and the number of females fell by 37%. Where these people go depends on perceptions of potential destinations, which are influenced by family and friends (Kirstein and Bandranaike, 2004), and on the motivations and trigger factors behind migration.

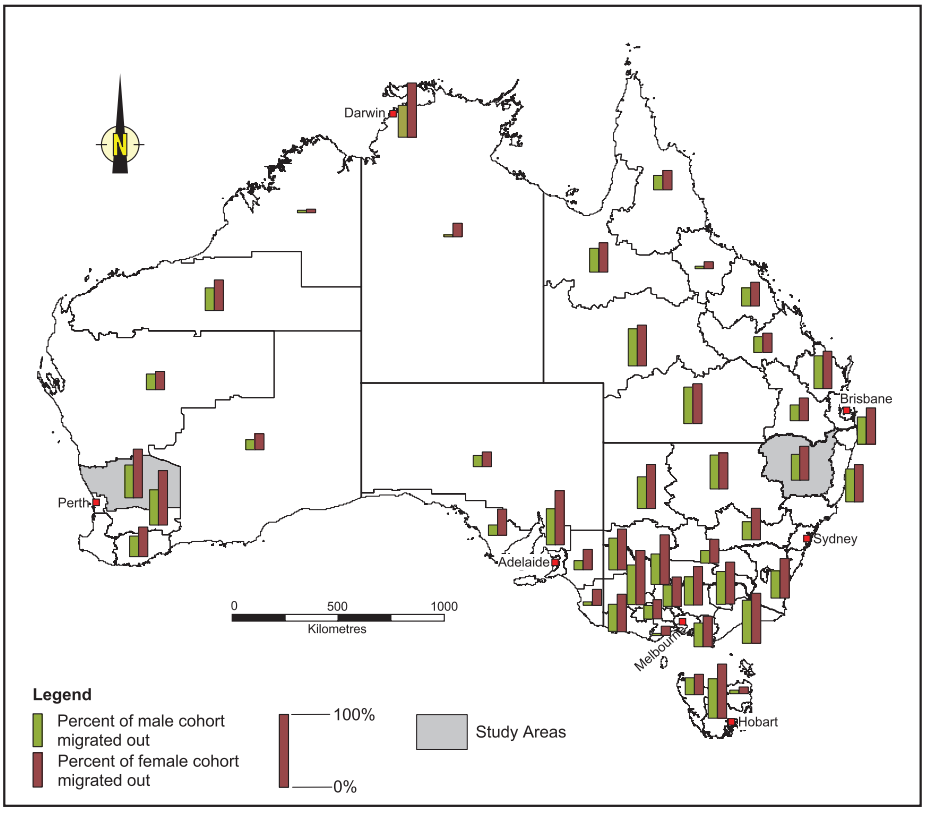

Figure 1 Proportions of 15–24 year old males and females moving from non-metropolitan Statistical Divisions, 1996–2001. *Source*: AIM database, 2005.

Causes of migration

There are many factors infuencing youth out-migration in rural Australia (Kirstein and Bandranaike, 2004). Some of the principal causes are to be found in the changing nature of the rural economy (see Walmsley *et al.*, 2006). The advance of technology has encouraged the substitution of capital for labour resulting in fewer job opportunities. Structural adjustment has fostered farm amalgamation, frequently reducing the size of the farm workforce. Drought, too, has played a part, linked to the cost-price squeeze that many farmers have experienced as a result of deteriorating terms of trade associated with commodity price fluctuations. Significantly, all of these factors interact and are often mutually reinforcing. The net effect very often has been that the local labour market is not big enough to absorb school leavers. This has encouraged young people to move elsewhere to seek post-secondary training (Hugo, 2001). This is an especially common practice for girls given their often higher Year 12 completion rates (Alston, 2004). Alongside these economic factors are a range of lifestyle factors, reflecting the fact that migration generally is increasingly driven by factors other than employment (Newton and Bell, 1996). For instance, the 'bright lights' syndrome attracts some rural youth wanting a change from what can be perceived as dull rural living.

The tendency for rural youth to flock to the 'bright lights' of the city is explored in Figure 2. This shows both the heavy rates of youth net migration loss from the inland of New South Wales and Queensland and the contrasting tendencies for this cohort to move to capital cities. As is obvious, in Queensland there is an almost inverse relationship between remoteness from Brisbane and the desire to move to a capital city. In rural New South Wales this trend is less evident, though by contrast there is a strong propensity for youth located in coastal regions to shift to their nearest capital cities: Brisbane or Sydney. Generally, women were only slightly more likely to shift to a city than men but there were also a number of cases where this situation was reversed.

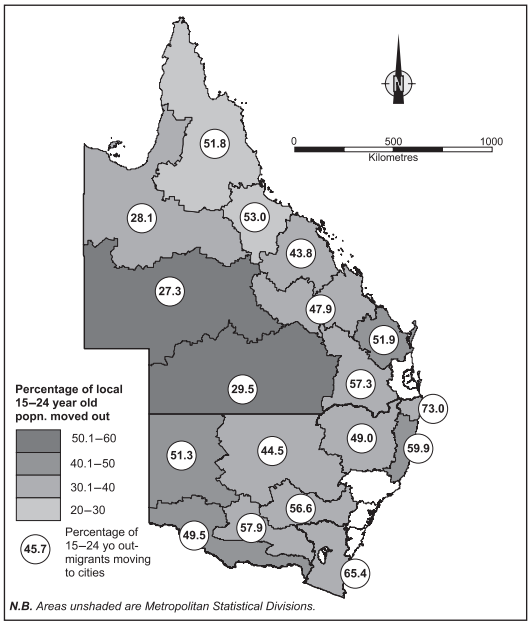

Figure 2 Proportions of 15 to 24 year olds migrating from non-metropolitan NSW and QLD. Statistical Divisions, and the proportion of 15 to 24 year old rural out-migrants moving to capital cities, 1996–2001.
Source: AIM database, 2005.

For some young women, in particular, a move away from rural areas may be a way of escaping a 'macho' culture (Alston, 2004) and a life where public spaces are often appropriated by young males for masculine performances (Kraack and Kenway, 2002). Perhaps this reflects uncertainty over the role of women in rural areas more generally. Certainly, there has been a long standing tension surrounding the involvement of women in necessary farm work and the ways in which this contrasts with desirable, domestic feminine accomplishments as defined by urban middle class notions of womanhood (Hunter and Riney-Kehrberg, 2002). Questions about the appropriateness of young people's behaviour often make them a target of adult anxiety (Kraack and Kenway, 2002), thereby fuelling a desire to escape.

Ideological shifts in government thinking, particularly as these relate to regulation of the economy and the environment, also encourage the out-migration of youth. The 'hands off' and 'user pays' thinking commonly exhibited by modern western governments manifests itself in a declining commitment to community service obligations. Not only does this diminish rural amenity and make rural life less attractive, the withdrawal of government services (and the accompanying withdrawal of private services) also contributes to a loss of job opportunities. In particular, there is a loss of meaningful work and training sites (Alston, 2004, 208), a fact compounded by the casualisation of work generally in contemporary society and the fact that much rural work is seasonal in nature and therefore has accompanying periods of unemployment. On top of this, a lack of affordable housing can lead to continued occupation of the parental home. This can cause tension and prompt a move. Such inter-generational tension reflects a wider issue: the contestation of the idea of a rural idyll. Around the world, young people are often seen as upsetting this idyll by introducing disquiet, crime and immorality (Kraack and Kenway, 2002) as they absorb a global culture which is often in conflict with local cultures. Escape from such pressures is often achieved only through out-migration. This is because the settlement pattern in much of inland Australia is so sparse as to constrain the size of commuting fields. Hard economic times can also have an impact on the costs of commuting, both in terms of the availability of cars and their running costs (Jentsch, 2006). This means that the option to live at home but escape for work elsewhere is limited.

It is wrong however to view out-migration from rural Australia purely in terms of push factors. Migration is a way of overcoming disadvantage. Rural youth might not in fact be as badly off as some other groups in society. Leaving home and moving away is very much part of the taken-for-granted world of young people: leaving to many is 'a simple rite of passage in rural life – a way to get ahead and the way it's been for a long time' (Lewis, 2005, 21). In essence, youth migration might be seen as an inevitable stage in the life cycle that, in the case of rural areas, occurs much earlier than elsewhere because of the limited availability of local employment and education opportunities (Kirstein and Bandranaike, 2004).

Overview

In summary, recent trends in rural youth migration are inextricably linked to the ongoing socio-economic and demographic decline of numerous inland regions and communities. However, it would be mistaken to think that youth out-migration is purely an inland phenomenon. As Drozdzewski (this volume) and Gibson (this volume) highlight, coastal regions – many of

which are archetypal counterurbanisation destinations – are also losing large numbers of young people. Rates of youth loss from rural regions have increased over the past twenty years, further undermining the stock of young people living in many communities and posing increased threats to their long-term viability. Yet the patterns, processes, causes and impacts of rural youth migration are distributed in a spatially-uneven fashion. Simple conclusions based at the broad national, State or even Statistical Division scale do not always apply so neatly at finer scales of resolution. In order to explore dimensions and impacts of rural youth migration in greater detail we now investigate recent trends in two contrasting inland regions: the Northern Tablelands, Slopes and Ranges of New South Wales; and the Central Wheatbelt of Western Australia (see Fig. 3 for general location of each case study area).

Two case studies in rural youth migration: the Northern Statistical Division of New South Wales and the Central Wheatbelt of Western Australia

As mentioned above, teenagers and young adults are the most mobile cohorts in Australia's population. Therefore, it is important to analyse in- *and* out-migration trends for localities and regions to gain an accurate picture of the aggregate impact of youth migration processes. Figure 4 displays the proportion of the 1996 youth population who left the LGAs of the NSW Northern SD and the WA Central Wheatbelt up until the 2001 Census. Looking first at the Northern SD, the heaviest losses have occurred in the LGAs contiguous with the Tamworth and Parry LGAs. Consistent with our findings above, a substantial proportion of this movement has been attracted to the dominant centre in the region, Tamworth, and its surrounds. Also noticeable in this map is the comparatively low proportional losses in the westernmost LGAs of Moree Plains and Narrabri.

The patterns of loss are more complex in the WA Central Wheatbelt. Here, surprisingly perhaps, areas of quite low loss (e.g. Nungarin) lie inland of a swathe of LGAs that have lost between one half and two-thirds of their 1996 youth population. Tables 1 and 2 reveal that, between 1996 and 2001, only seven local government areas within the two case study regions experienced a net migration gain. Even where net gain did occur, the overall numbers are small, with only Moree Plains in New South Wales Northern SD recording a net addition of over 100 young people. However, perhaps the most reliable way of interpreting the comparative size of flows to and from each of the case study LGAs is through the use of net migration rates. These are shown for the Northern SD and the Western Australian Central Wheatbelt in Figures 5 and 6 respectively.

Table 1 In- and out-migration and net migration gains and losses in NSW Northern SD LGAs, 1996–2001.

LGA	In-migration	Out-migration	Net migration loss/gain
Moree Plains	889	729	+160
Armidale-Dumaresq	1849	2461	–612
Tamworth (C)	1607	2173	–566
Gunnedah	370	695	–325
Inverell	483	799	–316
Tenterfield	238	409	–171
Uralla	181	348	–167
Guyra	103	267	–164
Glen Innes	211	355	–144
Manilla	93	237	–144
Narrabri	538	679	–141
Walcha	99	235	–136
Quirindi	145	279	–134
Parry	491	611	–120
Severn	63	126	–63
Bingara	41	98	–57
Nundle	46	82	–36
Yallaroi	132	161	–29

Source: Australian Bureau of Statistics, 2007.

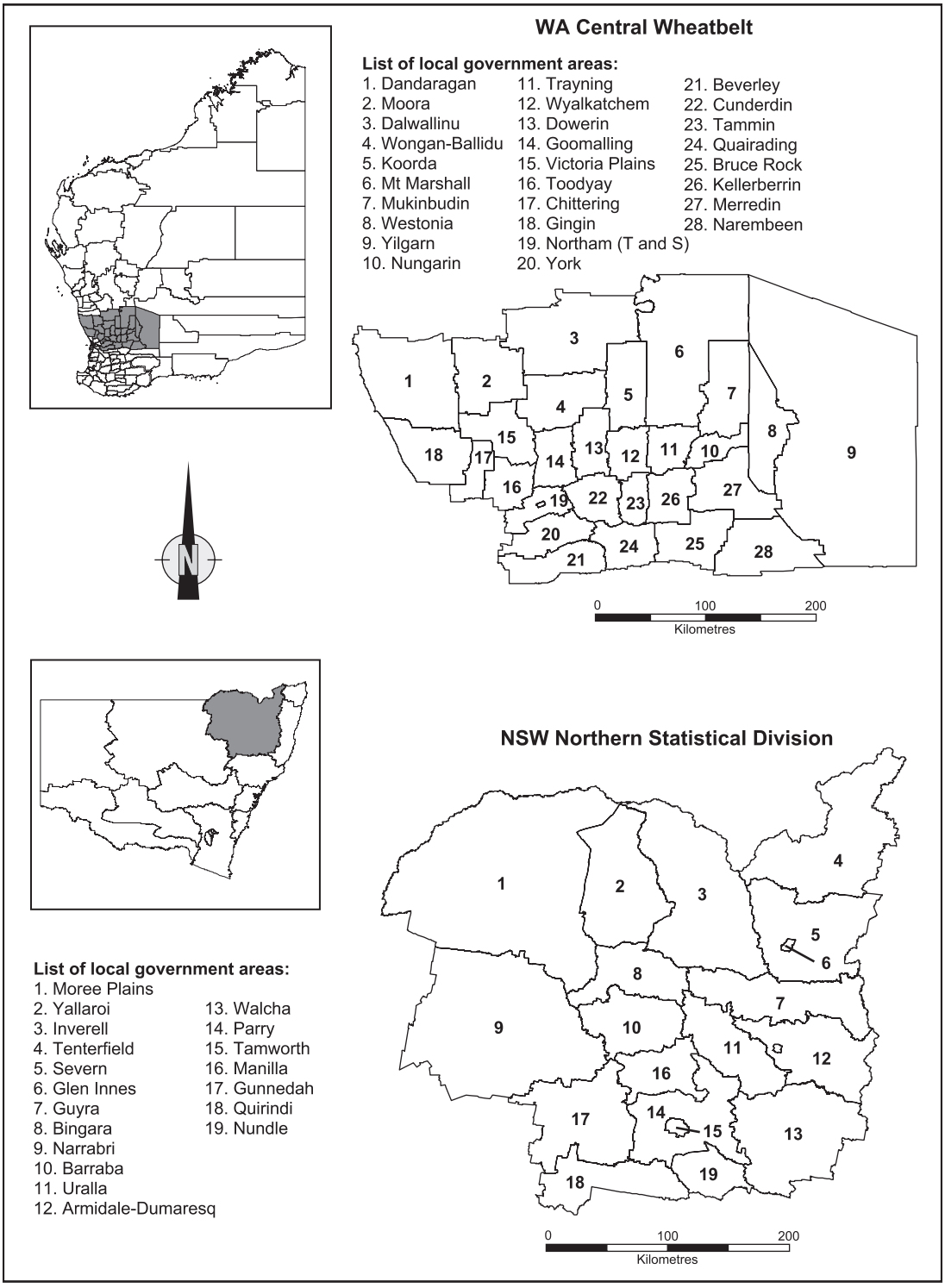

Figure 3 Location of case study areas.

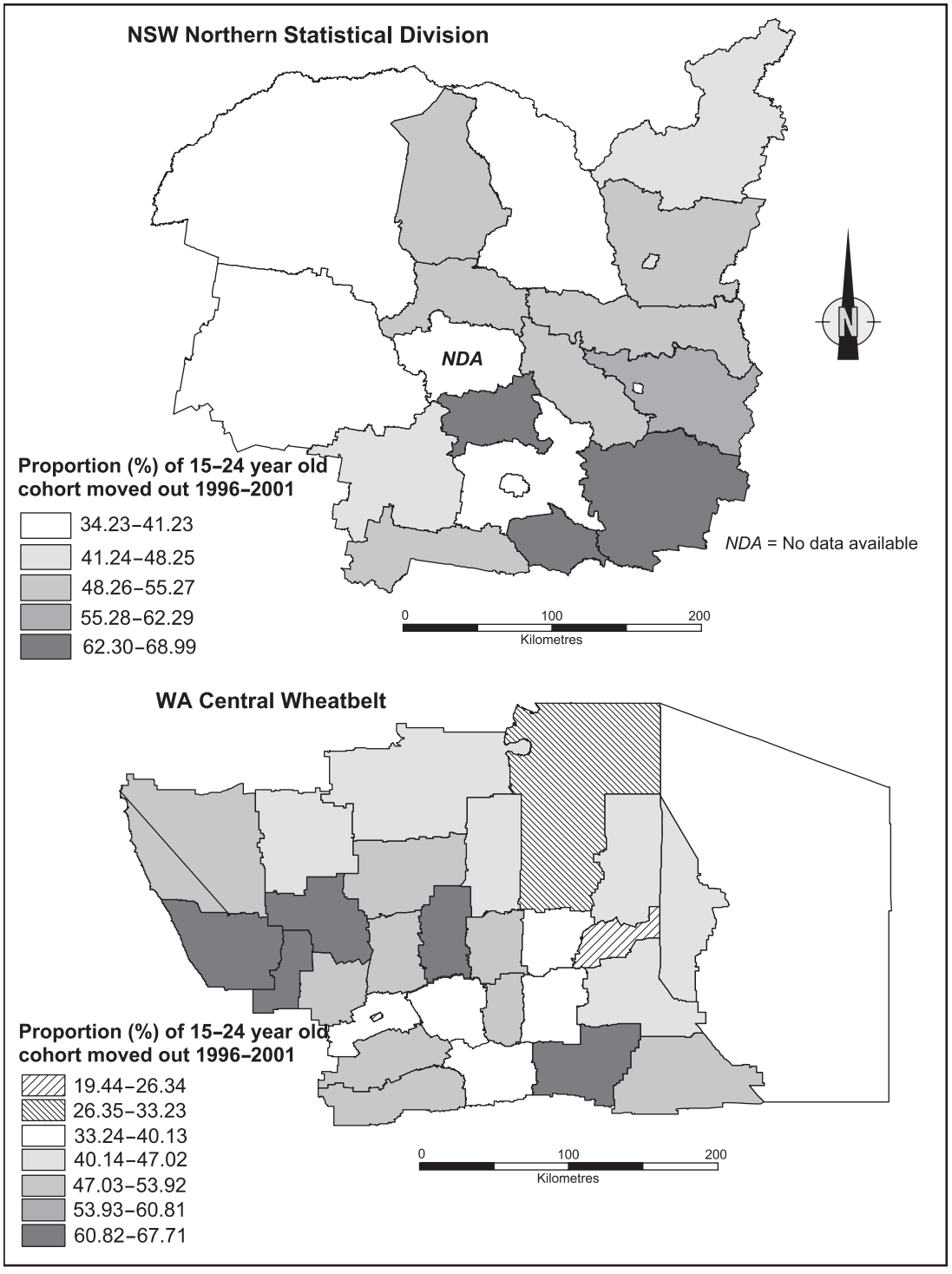

Figure 4 Proportions of 15–24 age cohort (1996 popn) migrating from NSW Northern Statistical Division and WA Central Wheatbelt, 1996–2001.
Source: Australian Bureau of Statistics, 2007.

Table 2 In- and out-migration and net migration gains and losses in WA Central Wheatbelt LGAs, 1996–2001.

LGA	In-migration	Out-migration	Net migration loss/gain
Dandaragan	147	122	+25
Dalwallinu	104	97	+7
Mount Marshall	31	23	+8
Nungarin	16	7	+9
Westonia	20	15	+5
Wyalkatchem	31	25	+6
Northam (S and T)	402	515	–113
Chittering	88	137	–49
Merredin	182	226	–44
Bruce Rock	36	68	–32
York	80	112	–32
Toodyay	122	152	–30
Kellerberrin	45	72	–27
Koorda	9	26	–23
Yilgarn	129	149	–20
Gingin	141	160	–19
Quairading	45	62	–17
Goomalling	37	52	–15
Dowerin	39	52	–13
Victoria Plains	54	65	–11
Cunderdin	54	64	–10
Narembeen	34	44	–10
Moora	134	143	–9
Beverley	51	55	–4
Mukinbudin	29	31	–2
Trayning	12	14	–2
Tammin	23	24	–1
Wongan-Ballidu	84	85	–1

Source: Australian Bureau of Statistics, 2007.

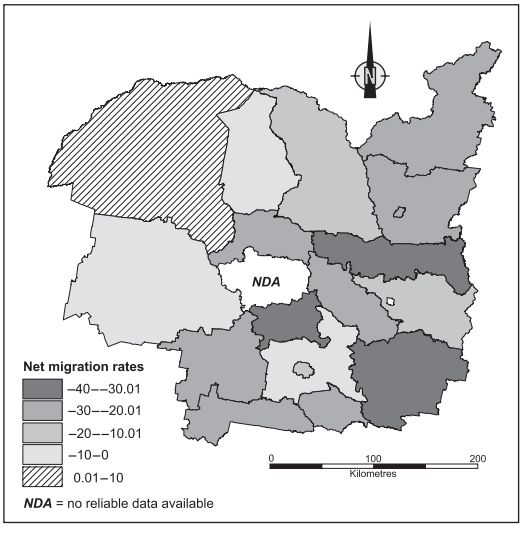

Figure 5 Net migration rates for 15–24 year olds, Northern Statistical Division, 1996–2001.
Source: Australian Bureau of Statistics, 2007.

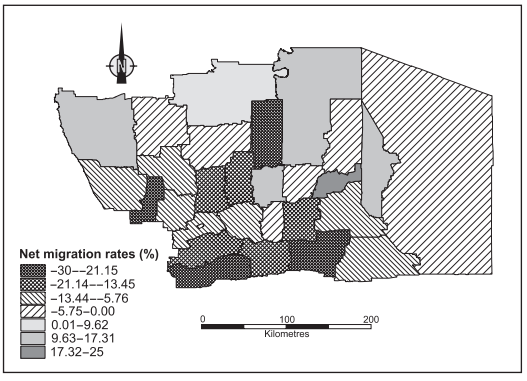

Figure 6 Net migration rates for 15–24 year olds, Western Australia Central Wheatbelt, 1996–2001.
Source: Australian Bureau of Statistics, 2007.

In the Northern SD of New South Wales the highest negative net migration rates (indicating high rates of net loss of youth) appear to occur in the LGAs in closest proximity to major

regional centres. For example, the relatively low density LGAs of Manilla and Bingara, which experienced high rates of youth net migration loss, are surrounded by the large regional service and administrative towns of Moree, Inverell, Armidale and Tamworth to the west, north, east and south respectively. Unfortunately, due to a data processing problem within the Australian Bureau of Statistics, no reliable data on migration trends to and from the LGA of Barraba are available. In the Western Australian Central Wheatbelt, six LGAs recorded a positive net migration rate: Dalwallinu, Dandaragan, Mt Marshall, Nungarin, Westonia and Wyalkatchem. No obvious spatial pattern relating to these rates of net loss and gain suggests itself, with both coastally-oriented and quite remote LGAs recording net migration gains. It must be stressed, though, that small net gains to low base cohort populations can translate into quite high positive net migration rates, which is the case for the majority of these LGAs. Nevertheless, Tonts (2005) has demonstrated that the Avon Valley, within which some of these LGAs are located, is incorporated in a zone of net migration gain radiating out from Perth.

As already discussed, there is reasonably strong evidence that rural youth migration is triggered, at least in part, by the desire for social and cultural mobility (i.e. a move up the social status and cultural opportunities ladder). For some, particularly those whose origins were in LGAs intermediate between major regional centres, the desire for greater social, cultural and economic opportunity lies in the move to the nearest provincial city (see Fig. 7). As Fig. 7 shows, substantial proportions of those 15–24 year olds leaving the Shires of Bingara, Manilla and Guyra moved to elsewhere within the Northern SD, with major centres and regions with a superior position within the regional urban hierarchy being popular destinations.

Somewhat surprisingly, Sydney was a relatively minor destination choice for Northern SD youth. This can be partly explained by two factors: 1) the relative non-affordability of housing in Sydney, compared to average real estate values across the Northern SD; and 2) the closer proximity of Brisbane, the Gold Coast, the Sunshine Coasts and their hinterlands. It is noticeable that the proportion of young people leaving the Northern SD for 'elsewhere in Australia' is highest for the northernmost LGAs (i.e. those LGAs contiguous with the NSW/Qld. State border) and, indeed, most out-migrants falling into this category did indeed move north. Comparing Figs. 7a and 7b, it is striking how similar the destination profiles are between the youth cohorts and the remainder of the population. The one difference of note is the slightly greater propensity of youth to move to Sydney compared to the rest of the population, particularly for the more southern LGAs.

By contrast, Fig. 8a reveals that, in the largely metropolitan-dominated State of Western Australia (see Rose, 1966), the preferred destination of wheatbelt youth is Perth. Overall, 52.7 per cent of youth migrating from the Wheatbelt during the 1996–2001 intercensal period shifted to the metropolitan area. Movement to other destinations in the wheatbelt constituted well under a fifth of all moves, while other destinations received just over a quarter of the Wheatbelt's young migrants. This is quite a marked contrast to Fig. 8b, which shows that *intra*-regional moves were dominant amongst those aged 0–14 and 25 years and over. Moves to Perth are in the minority for all but one LGA – Nungarin. The extent to which Wheatbelt youth may be attracted back to the region from Perth at a later stage in their life-course is considered by Davies (this volume).

Discussion and impacts

Notwithstanding the rich variety of triggers for, and patterns and processes of, rural youth out-migration in Australia, the effects are relatively uniform. Inland and rural migration often takes place over long distances because of the nature of Australia's settlement pattern. As a result, there is a strong likelihood that local bonds will be disrupted when migrants move away. This, coupled with a reduced local population and a thinning of local links, leads to the erosion of social capital (Cocklin and Dibden, 2005). Local communities can be robbed of future leaders because of the tendency for young achievers to be prominent among out-migrants (Gabriel, 2002). The problems of the erosion of social capital are clearly demonstrated in the case of sport (Tonts and Atherley, 2005). As young people move away, more and more communities find themselves unable to mount sporting teams. In areas where sport is significant in social life, the loss of such opportunities for interaction can increase social isolation (Tonts, 2005). More fundamentally, the out-migration of the young can have a major impact on the number of births in a community and thus its renewal. The heightened propensity of females to move compared to males leads to a gender imbalance in

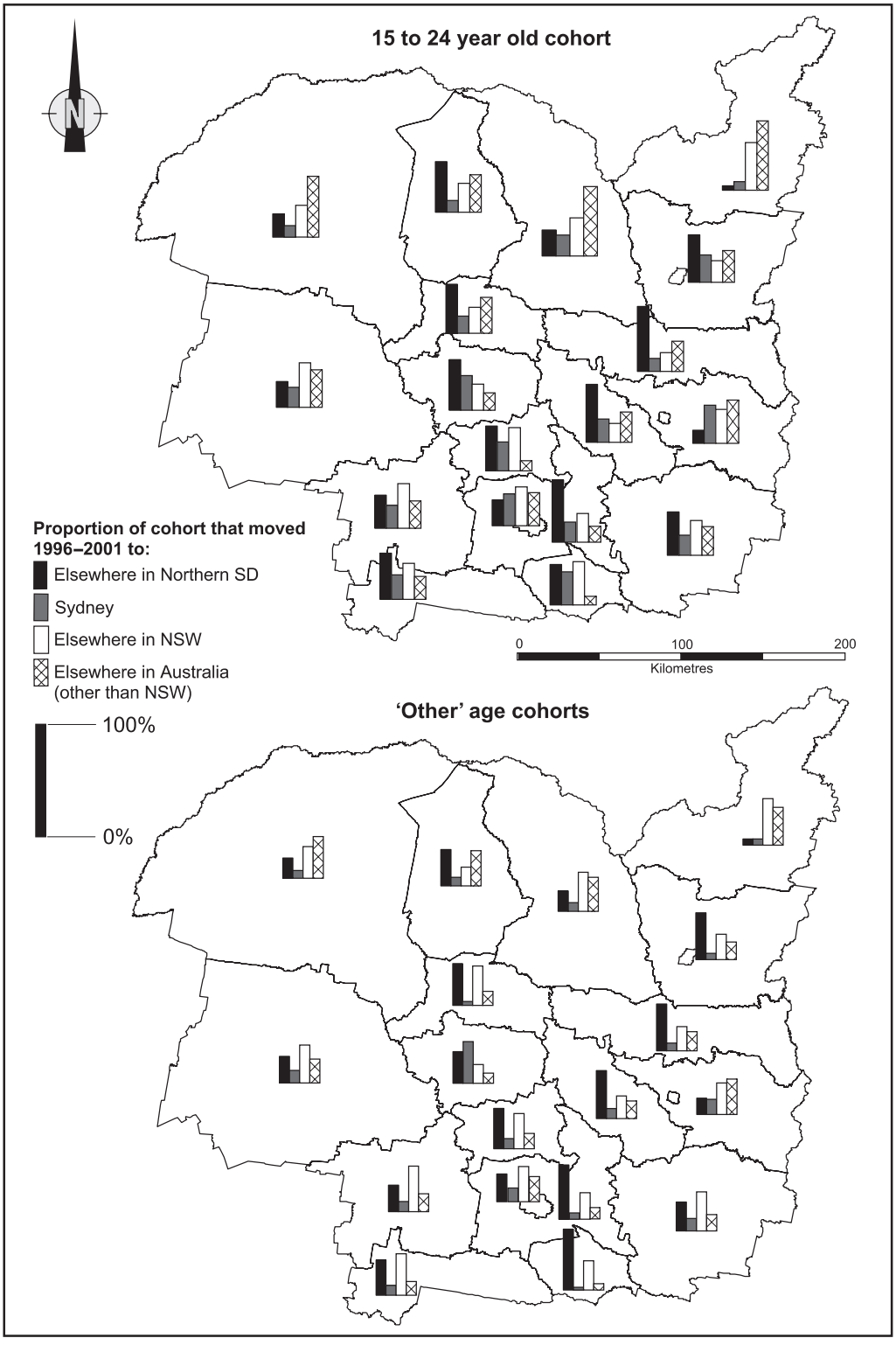

Figure 7 Destinations of 15–24 year olds and 'other' ages moving from Northern SD LGAs, 1996–2001.
Source: Australian Bureau of Statistics, 2007.

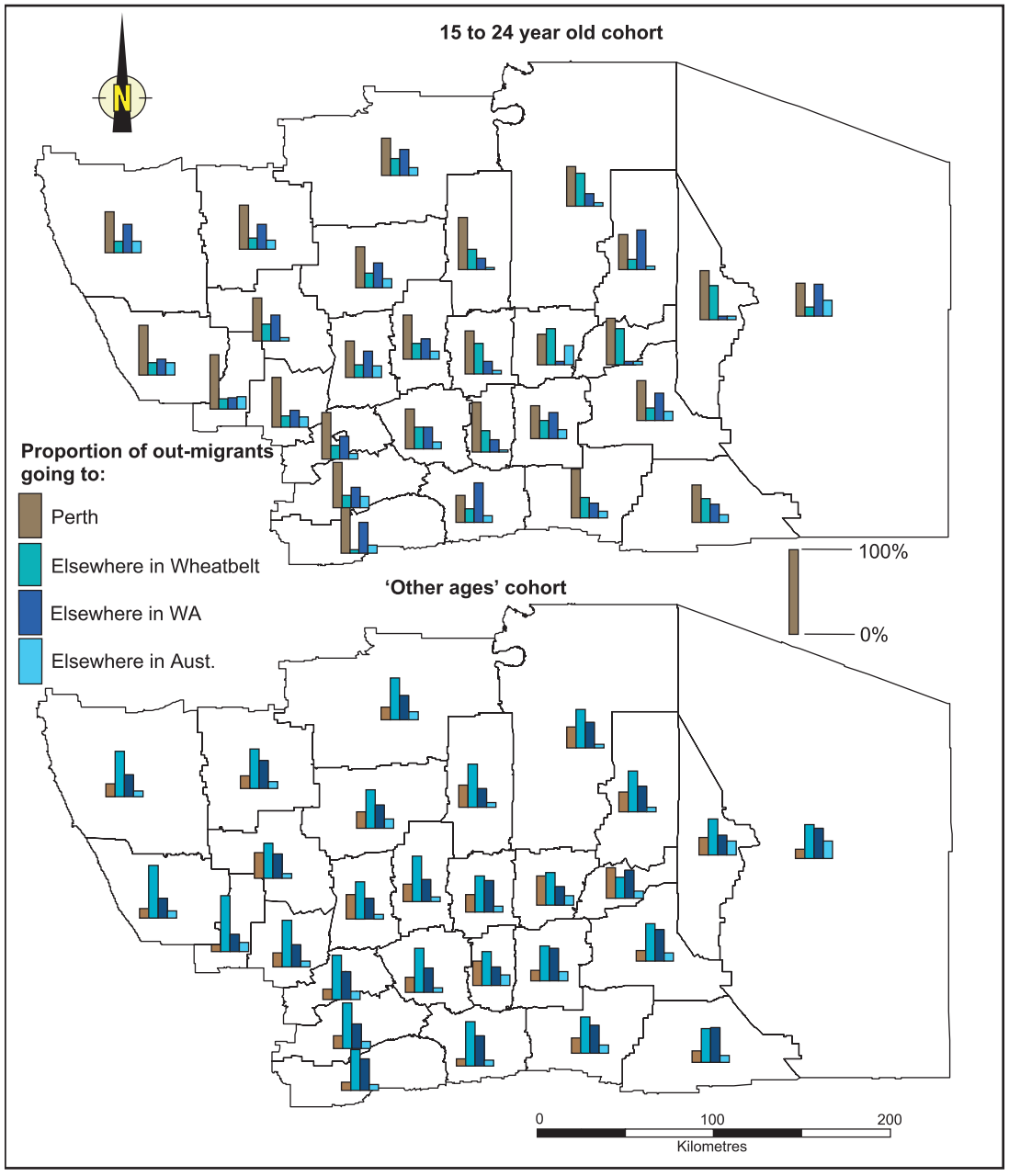

Figure 8 Major destination zones of WA Wheatbelt youth (15–24 year olds) and 'other age' cohort of Wheatbelt outmigrants, 1996–2001.
Source: Australian Bureau of Statistics, 2007.

rural areas and contributes to the inability of the remaining males, often tied to farms, to find marriage partners. Overall, too, a declining population can prompt a vicious cycle of economic decline (Sorensen, 1990). A smaller population base means a smaller local market. This can lead to the departure of some enterprises, resulting in a further diminution of career paths for those who remain. One consequence is that even those who initially stay may, at some stage, move away to further careers. Importantly, the outmigration of youth takes out of the community the cohort that is more likely to spend than save, meaning that the economic consequences can be

greater than the numbers alone would suggest (Walmsley *et al.*, 2006).

One response to the effects of out-migration is to try to keep youth at home or to lure them back once they have moved away. This is a response around the world not just in Australia. Another response is to differentiate between desirable youth (the best and the brightest) and undesirable youth (the unemployed, early school leavers, recreational drug users, single mothers) and to focus efforts on retention of the former group (Gabriel, 2002). Implicit in this kind of policy is recognition that young people in many advanced nations are among the most disadvantaged. Moreover, the changing nature of rural living may mean that rural youth are more disadvantaged in some respects than their urban counterparts (see Chapman and Shucksmith, 1996). Such a perception is of course predicated on the assumption that it is good to keep young people in rural areas. Jentsch (2006) has explored the moral basis for this proposition, suggesting that there are no explicit moral principles to support the provision of greater services for rural youth. Jentsch's view is that ensuring equal opportunity for rural youth is best achieved through 'youth mainstreaming', that is encouraging communities to take responsibility for all their members and exploring with young people how their goals and life plans can be achieved. In all such policy debate, it is of course important to recognise that 'rural youth' is a heterogeneous group with some similarities to urban youth (Jentsch, 2006). Any policy initiative needs to look at the entire context in which young people live, including cultural factors (family and community), politico-economic factors (access to jobs, education and housing), socio-political factors (power relations, identity and sexuality), and spatial factors (geographical variations in living conditions) (Panelli, 2002).

Conclusion

This paper has sought to critically explore the actual patterns, motivations and impacts of recent youth migration trends within, and out of, rural Australia. It has shown that youth migration processes are complex and often contrary to conventional assumptions. For example, some remote areas are receiving net migration gains of teenagers and young adults while booming 'sea change' coastal regions have experienced heavy losses of youth. In addition, rural youth migration has proved to be spatially complex. While the 'flight to the bright city lights' syndrome is evident, particularly in large regions with truncated urban hierarchies and a lack of major central places, we have also found that relatively high proportions of young people in the Northern SD of NSW move within their immediate region. This suggests that any attempt to generalise about rural youth migration must at least be cognisant of regional contexts.

Nevertheless, some common understandings concerning youth mobility were also confirmed by this research. Gender differentials in migration propensity between women and men are evident even at quite local scales. Young people are also more likely to search out capital cities than the rest of the population. And, sadly, despite the small net gains made in some Wheatbelt and Northern SD LGAs, most inland areas still continue to experience very heavy losses of their young people. Clearly, then, the adult bias in studies of rural structural adjustment needs to be complemented by increased research into youth migration and its consequences so that policy recommendations can be grounded in an informed understanding of what is a complex process.

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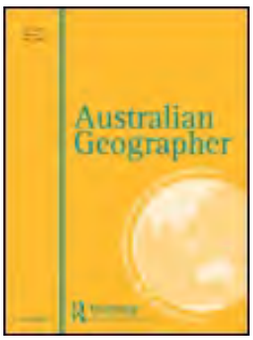

Australian Geographer

ISSN: 0004-9182 (Print) 1465-3311 (Online) Journal homepage: http://www.tandfonline.com/loi/cage20

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To cite this article: Neil Argent , Fran Rolley & Jim Walmsley (2008) The Sponge City Hypothesis: does it hold water?, Australian Geographer, 39:2, 109-130, DOI: 10.1080/00049180802056807

To link to this article: http://dx.doi.org/10.1080/00049180802056807

Australian Geographer, Vol. 39, No. 2,
pp. 109–130, June 2008

Routledge
Taylor & Francis Group

The Sponge City Hypothesis: does it hold water?

NEIL ARGENT, FRAN ROLLEY & JIM WALMSLEY, *University of New England, Australia*

ABSTRACT *The notion of sponge cities has attracted considerable attention in the media, in the policy arena, and in academia. It rests on the notion that some regional centres 'soak up' population and business from a 'pool' of surrounding areas, thereby appearing as 'oases' of growth in areas of population decline. Specifically, the notion of sponge cities rests on two premises and a deduction: some large towns and provincial cities are growing; surroundings areas are losing population; therefore, the growth results from the relocation of people from outlying farms and smaller towns to the nearby growing centres. Despite its popularity, the notion has largely gone untested. Investigation of migration trends in Dubbo and Tamworth (New South Wales, Australia), frequently cited as sponge cities, over the period 1986–2001 shows that the reality is much more complex than the simple metaphor suggests. The contribution made by the 'pool' to the growth of the regional 'sponges' is relatively minor. This calls into question the value of the notion of a sponge city—and the use of metaphors in social science more generally.*

KEY WORDS *Sponge city; migration; regional centre; metaphor; Australia.*

Introduction

> Sponge cities soak up the bush. (Salt 1996, p. 6)
>
> The bush bleeds. The sponge lives. (Salt 2001, p. 7)

Patterns of population growth and decline, and the changing fortunes of rural Australia, continue to attract the attention of academics, policy makers, and the media alike (see, for example, Beer *et al.* 1994; Baum *et al.* 1999; Wahlquist 1999; Gray & Lawrence 2001; O'Connor *et al.* 2001; Salt 2001; Stimson *et al.* 2003; Rogers & Jones 2006). The spatial selectivity of growth in high-amenity coastal and riverine areas, along major transport routes, and in select remote and regional centres stands in stark contrast with the continued population decline across much of the extensive cereal–livestock farming zones of each state (Hugo 2001). Indeed, the 'hollowing out' of much of the inland wheat–sheep belt is well documented (McKenzie 1994; Newton & Bell 1996; Walmsley *et al.* 2006), as are the processes responsible (Pritchard & McManus 2000), the concomitant changes in service

ISSN 0004-9182 print/ISSN 1465-3311 online/08/020109-22
DOI: 10.1080/00049180802056807

provision, and the impacts on rural communities and their residents (Rolley & Humphreys 1993; Argent & Rolley 2000a,b).

One phenomenon to have attracted considerable comment is the way in which some larger regional centres are growing in population despite being located in areas characterised by overall population decline. Such places are often referred to as 'sponge cities'—standing as islands of growth in a sea of population decline, soaking up population and services from their hinterlands. The present paper sets out to test the notion of sponge cities—the putative relationship between provincial 'sponges' and their regional 'pools'. It does so by looking at two case studies. Specifically, it first examines the extent to which the population increase of the two case study provincial inland towns is the result of net migration gain. Second, in this context, the paper investigates the primary origins of in-migrants to establish whether surrounding small settlements and farming areas are the dominant source of migrants (as postulated by the sponge city hypothesis) or whether, as conventional human migration theory holds, the origins and the size of flows are more complex than the 'sponge city' hypothesis suggests. Finally, the paper reflects on the value of the 'sponge' metaphor and of metaphors generally.

The sponge city phenomenon

The sponge city notion is most strongly associated with Bernard Salt, variously described (by himself) as a 'business advisor, author, speaker, columnist' (Salt 2006) and a 'cultural trends commentator' (Topsfield 2004). Salt is a partner in the private sector consultancy firm KPMG. Over the past 20 years Salt has garnered a substantial public profile through his media engagements, including a regular column for *The Australian*, occasional contributions for *The Age* and *Business Review Weekly*, and a busy corporate speaking program, through which he has popularised a number of trends in Australian demography and society. The frequently populist character of his media interventions has occasionally aroused the ire of specialists in the field, as in the case of O'Connor's (2001) critique of Salt's 2001 book, *The Big Shift*. O'Connor (2001, p. 49) argued that Salt had greatly exaggerated the significance of lifestyle factors in explaining current coastal population growth patterns.

The sponge city idea, apparently first coined as a term by Salt in the early 1990s, has been the subject of little critical scrutiny. It is defined as a:

> ... city in rural Australia that has experienced positive population growth in the last quarter of the 20th century, but which is positioned within broader regions of population decline. A typical sponge city has a critical mass and operates as a *de facto* capital city for a broader region. Retail and other services gravitate towards these cities. (Salt 2001, p. 174)

In this sense, a sponge city acts like a high-order central place, the functions and dominance of which may be growing as a result of centralisation and rationalisation moving services up the central place hierarchy (Humphreys 1990). Salt went on to claim that the sponge city also:

> ... acts as the nearest large town offering employment and training opportunities for young people leaving school. Sponge cities act as retaining dams in the region for people leaving the Australian wheatbelt.

> The sponge city effect applies in most Australian states to varying degrees. (Salt 2001, p. 178)

In other words, at the heart of the notion of 'sponge cities' is population movement in a migratory rather than just a trade sense.

According to Salt (2001, p. 7), from the 1970s small and remote towns in the interior—the wheatbelt areas of southwest Queensland, outback New South Wales, the Victorian Wimmera, Western Australia's Midlands, and the Lower North of South Australia, as well as the margins of the Outback—started to lose services and people as a result of global pressures forcing farm amalgamations, whereas selected provincial cities—'sponge cities'—appeared to 'actually soak up the population of the surrounding bush'. These cities, Salt says, are essentially swimming against the tide in a sea of demographic decline: 'small areas of ... growth, surrounded by great swathes of population loss' (Salt 2001, p. 64). Salt (1996, p. 37) suggested how this process may work:

> Pressures from farm aggregation lead to one farmer buying out another, who then moves to the main service centre for the region in order to maintain social links. The result is a 'sponge effect' where population and village services are transferred from outlying districts to local provincial cities.

The best examples of this phenomenon, according to Salt (1996, p. 6), include Dubbo, Wagga Wagga in New South Wales, Horsham in Victoria, and Narrogin in Western Australia, which are 'growing quite strongly whilst the broader region in which they are located records population loss'. Dubbo, in particular, is seen as Australia's best example of a sponge city, acting as a 'sort of retaining dam, holding back some of the outflow of population from the broader north-west regions of NSW' (Salt 2001, p. 64). To back up this claim, Salt observed that 'All municipalities bordering Dubbo to the north, west and south have experienced population loss' between 1976 and 1996, meaning that 'Dubbo sits as a demographic oasis within a desert of population loss' (Salt 2001, p. 66). The fundamental message is simple: 'It's almost as if Dubbo is soaking up the population of the surrounding bush. And to some extent it is' (Salt 2001, p. 66).

Although making little concession to the potentially complex patterns of internal migration, Salt does acknowledge some variation in the movement of population directly from outlying areas into sponge cities, suggesting that:

> ... those leaving the surrounding shires of Coonamble, Coonabarabran, Gilgandra and Warren would be either drifting into Dubbo or perhaps pressing on to the coast, to Bathurst or to Sydney. In either event, Dubbo presents an exception to the region—the populations of smaller communities surrounding the city are in consistent decline, whereas the population of Dubbo surges ahead at record rates for an inland town. (Salt 2001, p. 68)

He notes, too, that there are potential sponges that have failed—the 'wayward sponges'. These are towns like Armidale and Wagga Wagga, places that have acted as sponge cities for 20 years but then began to record population losses between 1998 and 2000 (Salt 2001, p. 149).

The thinking behind sponge cities seems to hinge, in essence, on two premises and a deduction: some large towns/provincial cities are growing; surrounding shires are losing population; therefore, the growth of provincial centres is the result of the relocation of people from outlying farms and smaller towns. The process whereby sponge cities emerge is thought to be driven by structural changes in agriculture (especially global pressures for economies of scale culminating in farm amalgamations, often linked to fluctuations in commodity prices). This is believed to result in a situation where population and services are transferred from outlying districts to local provincial cities because the 'outshifting farmer seeks to retain social links with the region, and also requires the health and recreation services offered by a big town' (Salt 2001, p. 174).

Support for the concept of sponge cities

Although the concept of a 'sponge city' is often attributed to Salt, the idea that some large, inland provincial centres are growing as a result of population moving from the surrounding areas, villages, and smaller towns is neither new nor Salt's alone. McKenzie (1994, p. 20), for example, in her discussion of growth in non-coastal cities and towns, suggests that:

> ... there are a number of traditional service centres, located strategically on road and rail networks and with specialist government and educational functions, that are emerging as centres of population growth. Examples included Toowoomba, Armidale, Tamworth, Dubbo, Wagga Wagga, Albury Wodonga and Ballarat ... The growth of these centres is fuelled largely by in-migration from the regions they service, and this has recently been aided by an expansion of the scope of tertiary education in many of these centres.

To a degree, the notion of 'sponge cities' also received endorsement from the Productivity Commission (1999, p. 25), which used the sponge city phenomenon as an explanation for regional demographic change, citing Dubbo as an exemplar of the process. The Commission suggested that the factors driving the development of the phenomenon include some 'direct migration to provincial cities from the surrounding district' (retiring farmers, farmers who have sold out, or others who moved to find work) and the concurrent concentration of some banking, government, retailing, and other services at the expense of surrounding small towns. At the same time, the growth of sponge cities is 'probably helping to strengthen the long-term growth prospects of the regions in which they are located' (Productivity Commission 1999, p. 27).

By repetition, and almost by stealth, the 'sponge city' concept seems to have been absorbed into conventional wisdom over the past decade. It is increasingly reported in the media and incorporated into policy documents. Media comment is perhaps exemplified by the Australian Broadcasting Commission's (ABC) *Lateline* (18 July 2000) 'Town sizing' report on the decline of small inland settlements, which included the comment that many regional centres 'have acted like sponge cities, the Waggas, the Dubbos, the Albury–Wodongas of this world have basically been strengthened and built upon ... They've actually sucked the life out of many of the surrounding towns' (ABC 2000).

An illustration of the sponge city concept in policy discussion is to be seen in the Queensland Department of the Premier and Cabinet's *Demographic Newsletter* (2001), which included the following definition of a sponge city:

> A rural city which has experienced positive population growth in the last quarter of the 20th century, positioned within broader regions of population decline. Often these are populated with farmers displaced by farm amalgamations who are keen to retain social links with the region, or for their families to access employment and training and general health and recreation services (e.g. Roma and Emerald).

Similarly, the Commonwealth Department of Parliamentary Services, in a research note on regional telecommunications for the Parliamentary Library (2005, p. 1), suggested that the most significant regional demographic trend to affect the demand for telecommunications services is the 'sponge city effect', 'the trend of inhabitants moving from smaller outlying regions into larger regional centres', an effect that it saw as repeated across numerous regions in Australia.

As a consequence of this attention, the sponge city idea has begun to be reinterpreted as one of the key patterns of internal migration now characterising non-metropolitan Australia. Wahlquist (1999), for instance, suggested that there are basically three population movements in such areas: (1) the decline in the dryland wheatbelt and the contraction of smaller towns; (2) sponge cities like Dubbo, which are growing at the expense of outlying towns as services become concentrated in regional centres; and (3) the continued drift of the population to the coast. This is a theme identified, in part, by the Productivity Commission's Final Report (1999, p. 19), which suggested that, despite the proportional shift in population away from large cities to smaller cities and large towns, the picture at the regional level is not straightforward: 'Two major trends occurring in country Australia are masked by analysis at the regional level. They are "coastal drift" and the formation of "sponge cities"'.

In comparison with the media and policy arena, the academic literature seems to have been slower to incorporate the notion of sponge cities. However, tacit acceptance seems indicated by the increasing number of mentions (see, for example, Foskey 1998; Birrell & O'Connor 2000; Daly 2000; Gray & Lawrence 2001; Alston 2002; Budge 2006). Nonetheless, there is murkiness in the analysis surrounding the concept and a lack of clarity in conceptual terms, particularly in relation to patterns of population growth and decline, sources of in-migrants, destinations of out-migrants, links with structural change, and the rationalisation and centralisation of service and retail provision. The concept's appeal undoubtedly lies in its simplicity and apparent cause-and-effect logic. However, it seems not to have been seriously tested. It may be, then, that the concept of a sponge city is a classic case of faulty logic: two correct premises followed by an incorrect conclusion. That some regional centres are seemingly 'swimming against the tide in a sea of demographic decline' is not in dispute. The source of population growth for these regional centres is, however, much less clear.

A tale of two (sponge) cities: the migration evidence considered

In order to test the notion that the sustained population growth of major inland (although not remote) regional centres has been driven by their capacities to soak

up flows of hinterland residents, data on usual place of residence on Census night, cross-tabulated with place of residence 5 years ago for the 1991 and 2001 Censuses, were requested from the Australian Bureau of Statistics (ABS). This data set provided two snapshots of inter-regional migration dynamics, separated by one decade, during the era in which Salt developed his 'sponge cities' concept. For the present paper, we have restricted the spatial focus of our testing to the internal migration flows between the selected 'sponge city' itself, all immediately contiguous shires, the Sydney metropolitan region, the remainder of New South Wales, and elsewhere in Australia. For convenience, we have labelled the contiguous local government areas surrounding the two sponge cities as 'pool' shires, partly to extend the hydrological theme of the 'sponge city' metaphor, but also to reinforce in the reader's mind that it is within this zone that Salt himself saw the 'sponge city' having its greatest demographic impact.

Before embarking on the empirical analysis, we also need to be clear about the limitations of our migration data. First, although the cross-tabulated ABS Census internal migration data provides us with the most reliable indication of, for example, the number of ex-Dubbo hinterland residents who had taken up residence in the Sydney metropolitan region between 1986 and 1991, it cannot account for any multiple moves that a person or household may make during this period. Data from the 1-year migration question may have provided greater clarity on this point, but there are similar problems with this indicator in undercounting migration moves (see Bell & Hugo 2000). It is entirely possible, for instance, for some of those who had registered a move to Sydney at the 1991 Census, from the Shires surrounding Dubbo, to have first moved to Dubbo before then migrating onto the state capital. Therefore, the following analysis provides a useful, but relatively crude, stocktake of inter-regional changes of residence for each 5-year intercensal period.

Similarly, the choice of centres to test the 'sponge city hypothesis' was restricted first by the lack of suitability for the task of the official spatial units in the Australian Geographical Standard Classification (AGSC) and, second, the lack of availability of migration data for spatial units below the Local Government Area (LGA) level. Most so-called 'sponge cities' are located within larger LGAs, in which they appear as a large urban node set within a regional hinterland (e.g. the Shire of Wagga Wagga). Nevertheless, despite the incremental restructuring of local government that has occurred across New South Wales over the past 10 years, some rural-based municipalities survive. These are effectively regional city councils whose spatial boundaries delimit the city from its broader hinterlands. Tamworth is a case in point. This, together with its well-recognised role as a key administrative and service centre, makes it ideal for testing the sponge city hypothesis. Given all the many claims made about its status as a regional centre, Dubbo is another obvious candidate. Although it was not a municipality like Tamworth at the Census in question, the non-urban population of the Shire comprised less than 20 per cent of the total at the 2001 Census. It is not an unreasonable inference, then, to assume that the majority of migration flows to and from Dubbo LGA are associated with Dubbo city rather than the rural component. In summary, both Dubbo and Tamworth satisfy virtually all the criteria for a 'sponge city' and, with only relatively minor spatial definition and data problems affecting the interpretation of migration flows to Dubbo, both were chosen as case studies in the present analysis.

Dubbo (population approximately 38 000 in 2001) is the regional service centre and focus of much activity for the western region of New South Wales. Located 420 kilometres north-west of Sydney, at the confluence of major regional road, rail, and air transport routes, Dubbo's early development was based on its role as an agricultural service centre with the abattoir still the largest employer. The centre provides a wide range of urban services in education, health and welfare, and tourism. It is the key retail centre for residents of the surrounding shires of Narromine, Cabonne, Wellington, Coolah, Gilgandra, Warren, Parkes, Lachlan, Bourke, and Coonamble. Fulfilling a comparable role in the urban hierarchy of New South Wales and located a similar distance north of Sydney, Tamworth (population approximately 36 000 in 2001) is a significant business, industrial, and service centre for residents of the north and north-west of New South Wales—particularly the surrounding shires of Parry, Nundle, Walcha, Uralla, Manilla, Gunnedah, Quirindi, and Barraba (see Figure 1).

Dubbo and Tamworth are major administrative service centres for central west and northern New South Wales, respectively. The analysis by Stimson *et al.* (2003) of opportunity and vulnerability among Australia's non-metropolitan centres places both Dubbo and Tamworth within their 'service-based opportunity' cluster. This cluster has the structural characteristics of above-average employment in social and personal services, an above-average proportion of the population with tertiary level

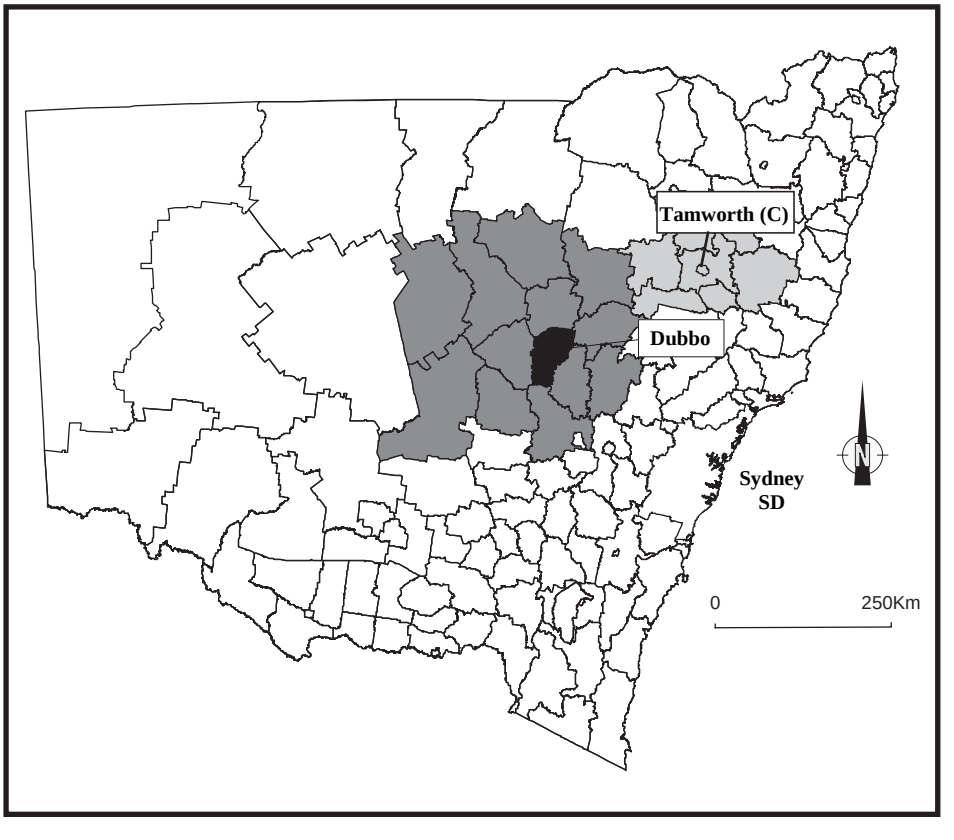

FIGURE 1. New South Wales non-metropolitan local government areas, showing Tamworth and Dubbo local government areas.

degrees, and high labour force participation rates. However, and perhaps reflecting these towns' attractiveness to lower socioeconomic status groups in search of employment and cheaper housing, this cluster is also characterised by above-average and high unemployment rates and relatively large numbers of low income households, single parents, and aged persons (Stimson *et al.* 2003, p. 137).

Tamworth and Dubbo have maintained populations above 30 000 throughout the past three intercensal periods, although Dubbo's overall population growth (21.8 per cent from 1986 to 2001) has been much more rapid than Tamworth's (6.4 per cent over the same period). Both are located in areas of general population decline (Figures 2 and 3). To some extent, then, both appear to be illustrative of oases of growth amidst a spreading desert of demographic decline within the dry inland.

Figures 4–7 show the origin and size of in-migration flows to the two case study 'sponge cities' of Tamworth and Dubbo for the 1986–1991 and 1996–2001 intercensal periods. True to Salt's 'sponge city' notion, in-migration flows to both centres from adjacent and nearby LGAs are certainly evident. Tables 1 and 2 show the size of these flows relative to total in-migration flows to these towns. However, the figures and tables make it clear that local inflows are completely dwarfed by the volume of migrants from Sydney and other states and territories. As Tables 1 and 2 reveal, even though the actual number of in-migrants to Dubbo from Sydney has almost halved between the two intercensal periods, and dwindled by over one-third to Tamworth, Sydney and origins outside New South Wales remain the dominant

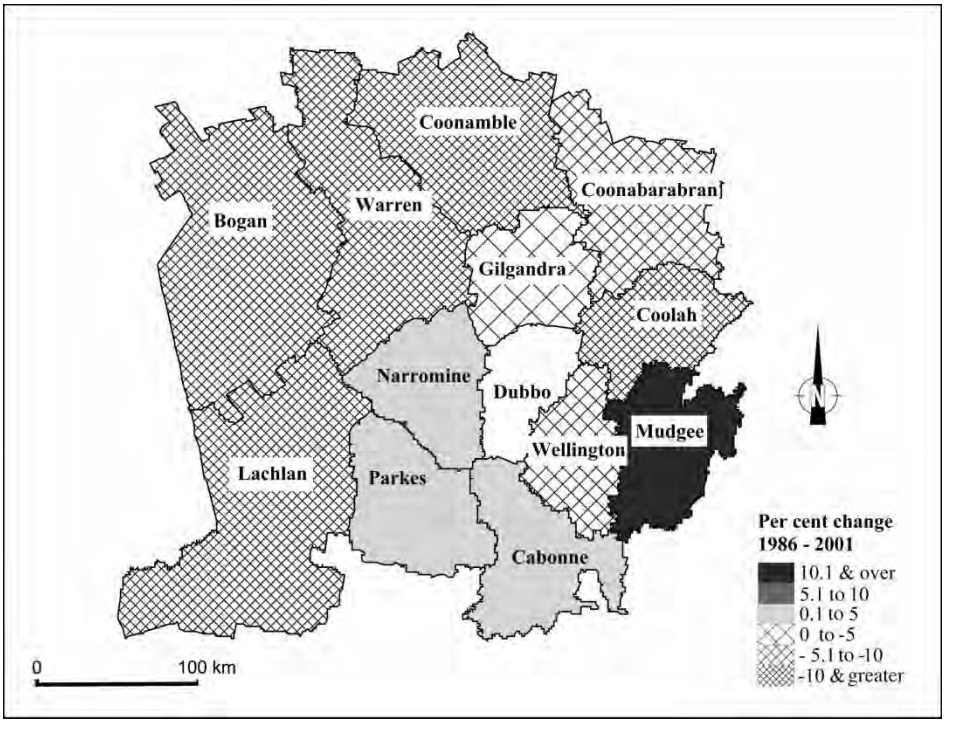

FIGURE 2. Population change in the local government areas surrounding Dubbo, 1986–2001.
Source: Australian Bureau of Statistics (1989, 2003).

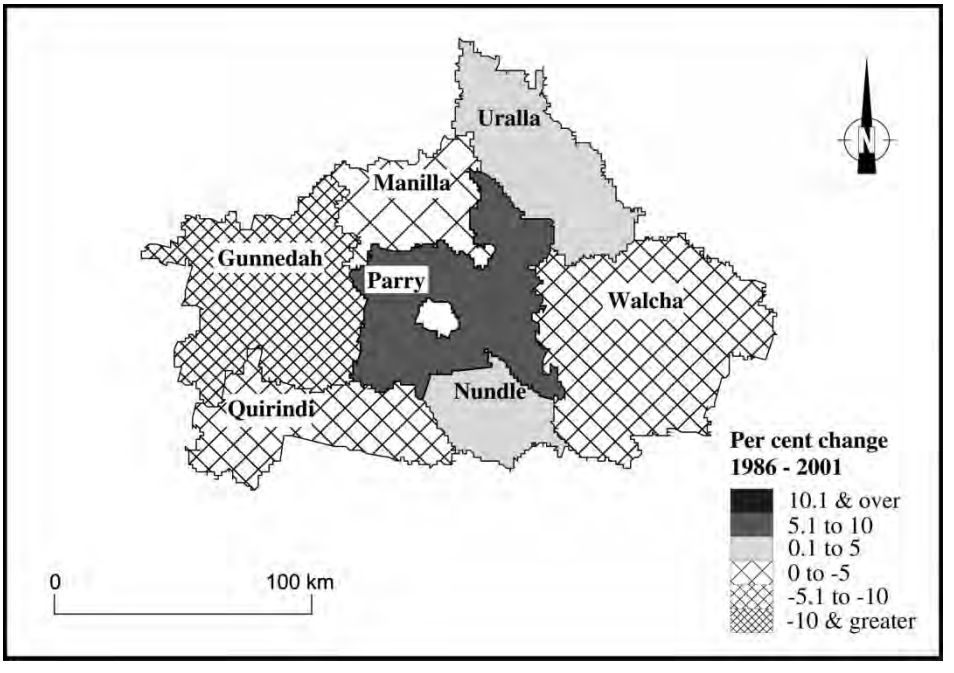

FIGURE 3. Population change in the local government areas surrounding Tamworth, 1986–2001.
Source: Australian Bureau of Statistics (1989, 2003).

sources of in-migrants. With one notable exception (that of Parry Shire around Tamworth), out-migration from the shires surrounding these two regional centres comprises less than 5 per cent of each centre's in-migration flows.

So, despite the important administrative and service functions that Tamworth and Dubbo play at the peak of their respective regional urban hierarchies, they draw new residents overwhelmingly from Sydney and from outside the state, rather than from their own hinterlands. What is more, despite the marked decline in counterurbanisation flows to both centres between 1996 and 2001—and consistent with Hugo's (2005) findings concerning the waning of the 'population turnaround' in Australia—there is little evidence, particularly in Tamworth, that surrounding regions are compensating for this dissipating current. In the case of Dubbo, which has seen a halving of the inflow from its major source of migrants (the Sydney Statistical Division), some of the surrounding shires have become proportionally more important sources. For instance, Narromine's share of Dubbo's in-migration volumes doubled between the two intercensal periods, but still represents barely 5 per cent of these flows.

However, to test the 'sponge city' hypothesis fully, it is necessary to reverse the focus of the discussion from the so-called 'sponges' to their respective 'pools'. There are, after all, flows and counter-flows in internal migration throughout inland Australia (Walmsley *et al.* 2006). Tables 3 and 4 show measures of Tamworth's and Dubbo's 'pull' on regional migration flows for the two intercensal periods, 1986–1991 and 1996–2001, respectively. The first variable, net migration, is a measure of simple net migration gain or loss between the two 'sponge cities' and

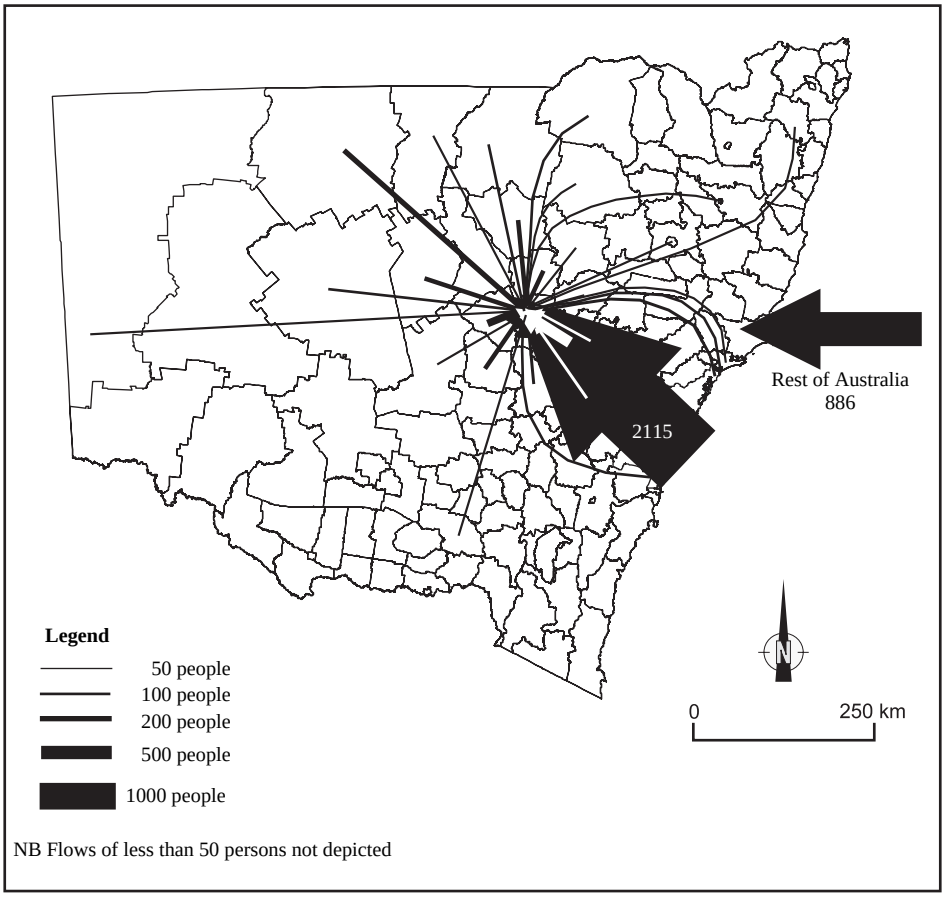

FIGURE 4. In-migration flows to the Dubbo local government area, 1986–1991.
Source: Australian Bureau of Statistics (2006).

each of the 'pool' shires. As is clear in both tables, there is only one case where the regional centre experienced a net migration loss to a surrounding shire: that of Parry. Net migration gains for Tamworth from the neighbouring shires of Gunnedah and Manilla, situated on the northern slopes and plains, have increased over time, as have net migration gains for Dubbo from the majority of the surrounding shires to its west and north (Coonamble, Coonabarabran, Gilgandra, Narromine, and Warren). Net gains from the south-eastern shires of Cabonne and Mudgee are relatively small and have declined over the study period. These two shires are more closely interlinked with migration streams in and out of Sydney than those to their west.

Tables 3 and 4 also display the proportion of each of the 'pool' LGAs out-migration flows that took up residence in Tamworth and Dubbo, respectively. This indicator effectively tests Salt's claim that the growth of 'sponge cities' is predicated upon their 'soaking up' of the population from their respective farming hinterlands. As is clear from Tables 3 and 4, relatively small proportions of the people leaving the 'pool' shires moved to the two case study centres. The most obvious exception to this is Parry Shire, where approximately one-third of its out-migrants moved to

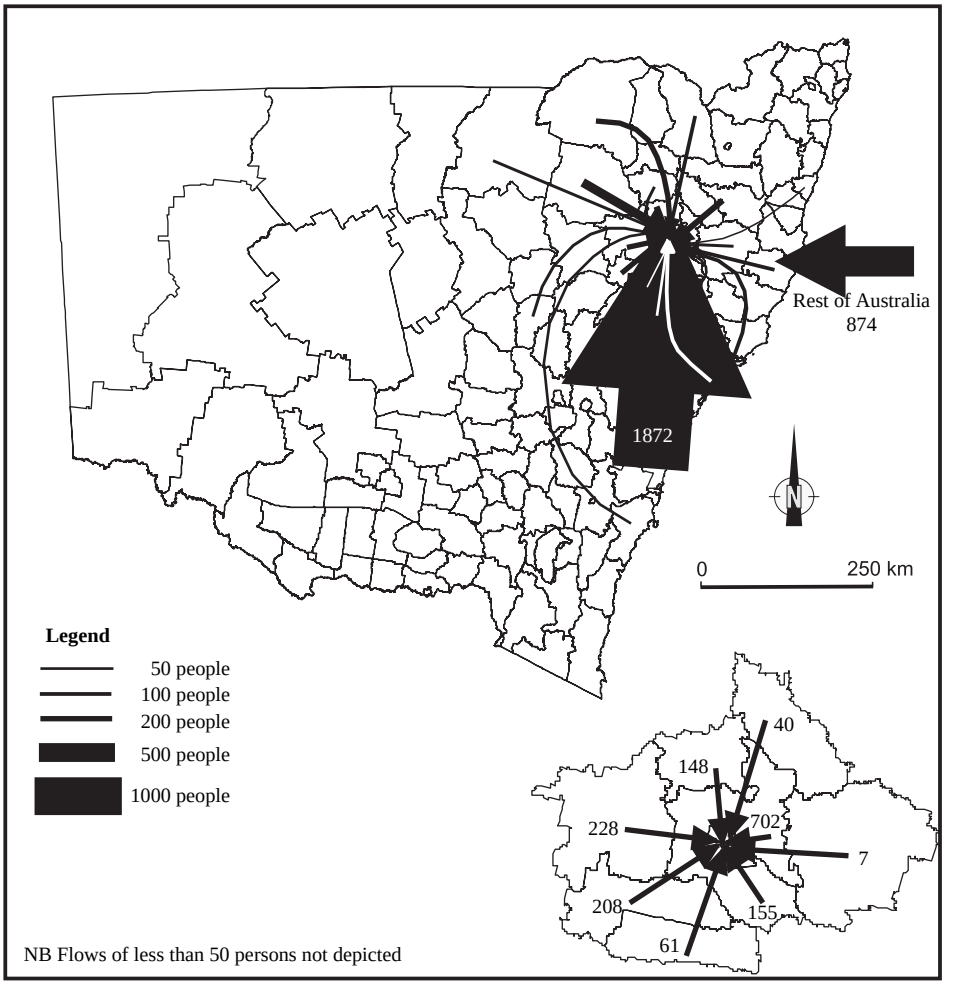

FIGURE 5. In-migration flows to the Tamworth local government area, 1986–1991.
Source: Australian Bureau of Statistics (2006).

reside in Tamworth, but even this result is misleading because, as just discussed, this Shire enjoyed a net migration gain from the regional centre.

Migration effectiveness ratios (MERs) for the case study towns and their surrounding shires are given in Table 5. MERs show the rate at which a population experiences net change at the end of a period relative to gross migration flows. The calculations in Table 5 have been made from the exchange perspective of the 'sponge city', so that a positive figure means that the 'sponge city' had a net gain in the two-way flows. Migration effectiveness is clearly highly variable within the hinterlands of both centres. Surrounding Tamworth, migration effectiveness is highest—approaching or even exceeding 50 per cent—in the primary resource-dependent shires. The effectiveness of population flows between Tamworth and the two adjacent shires of Manilla and Gunnedah have approximately doubled over the two intercensal periods, whereas that of Nundle has halved. The latter result is perhaps a reflection of the town's growing status as a rural lifestyle village, its

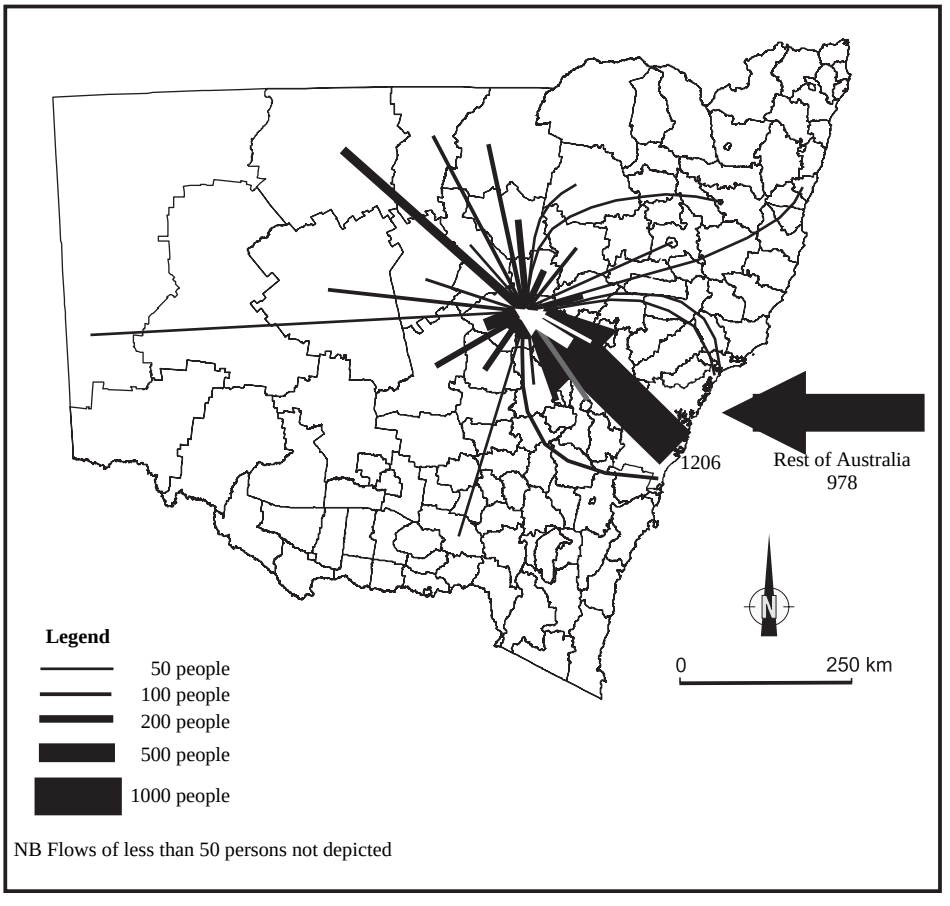

FIGURE 6. In-migration flows to the Dubbo local government area, 1996–2001.
Source: Australian Bureau of Statistics (2006).

increasing tourism activity, and its attractiveness to repopulation (Lewis & Maund 1976). Surrounding Dubbo, the MER is similarly variable between shires and between the two intercensal periods. Rates are high for the remoter LGAs lacking a major regional centre, such as Coonamble and Lachlan, as well as for the nearby Coolah Shire. This last case is perhaps surprising given Coolah's much-heralded success in reinventing itself following the scaling down of the forestry industry (Sorensen *et al.* 2002). In short, as with migration rates generally, MERs display considerable variability and imply that local factors are more important than the general 'sponge' model in influencing migration patterns.

Overall, then, the combined analyses of the sources of in-migration flows to the two archetypal so-called 'sponge cities', as well as examination of migration currents between these regional centres and their hinterlands, places serious doubt over the sponge city notion advanced by Salt and uncritically perpetuated by others. Yet, there is one more avenue left that requires investigation to fully test the veracity of the concept.

According to Salt, sponge cities are essentially saprophytic: their population growth and economic robustness are essentially based upon the capture of

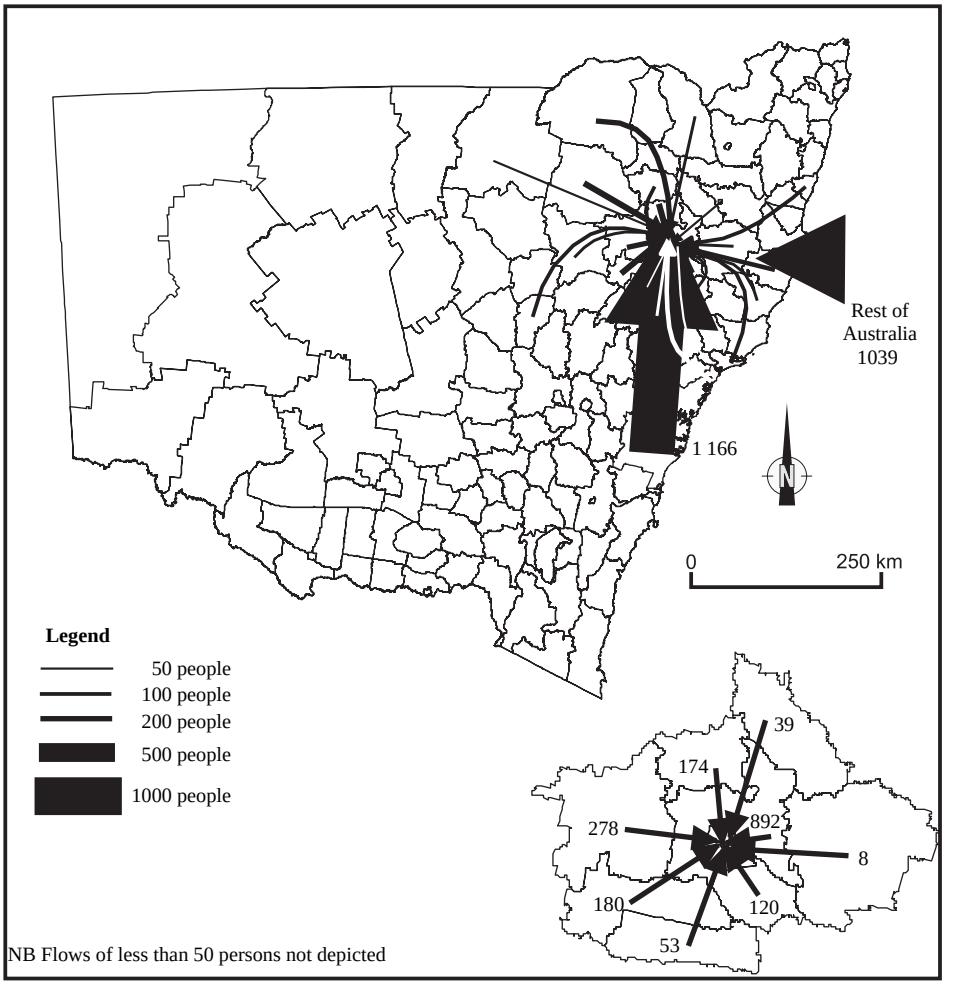

FIGURE 7. In-migration flows to the Tamworth local government area, 1986–1991.
Source: Australian Bureau of Statistics (2006).

population and businesses from the immediate region. Therefore, although it has been shown that the 'pool' shires were comparatively meagre contributors to the migration streams to Tamworth and Dubbo during the late 1980s and late 1990s, it nevertheless may be the case that such small outflows constitute a large share of each shire's population base. To test for this, Table 6 shows, for each of the 'pool' shires, the number of out-migrants who moved to their local regional centre during both intercensal periods as a proportion of each shire's total population at the start of each period (1986 and 1996). As is clear from Table 6, even for those shires (with the possible exception of Nundle) with relatively high migration effectiveness rates and high proportions of their out-migrants locating in a nearby 'sponge city', such flows are only tiny shares of each shire's population base.

In short, analysis of census internal migration data shows that there is little demographic evidence to support Salt's contention that some of Australia's more prominent and economically successful regional centres, such as Tamworth and

TABLE 1. Major in-migration sources for the Dubbo local government area, 1986–1991 and 1996–2001 (per cent)

Origin	1986–1991	1996–2001
Sydney Statistical Division	34.20	17.91
Bogan	1.92	1.22
Cabonne	1.11	1.05
Coolah	1.53	2.15
Coonabarabran	0.84	1.40
Coonamble	1.95	2.67
Gilgandra	1.82	2.66
Lachlan	0.83	1.08
Mudgee	1.50	1.65
Narromine	2.84	5.10
Warren	1.03	1.29
Wellington	4.36	4.80
Other NSW	33.54	42.49
Rest of Australia	12.53	14.53

Source: Australian Bureau of Statistics (1989, 1994, 1999, 2003).

Dubbo, owe their success to their capacity to 'mop up' the populations of their respective penumbral zones. What the data analysed here do suggest is that intra- and inter-regional migration currents are highly complex and certainly much more complex than the simplistic 'sponge city' metaphor suggests.

Metaphors and scientific enquiry: a critique of 'sponge cities'

As noted earlier, the 'sponge city' notion has gained quite extraordinary popularity among the popular media, high-profile policy bodies, and 'think-tanks', and only slightly less purchase among academics. This is surprising given the idea's unproven status and, indeed, its contradiction of time-honoured, fundamental

TABLE 2. Major in-migration sources for the Tamworth local government area, 1986–1991 and 1996–2001 (per cent)

Origin	1986–1991	1996–2001
Sydney SD	25.38	16.30
Parry	9.52	12.47
Narrabri	3.23	2.59
Gunnedah	3.09	3.89
Quirindi	2.82	2.52
Moree Plains	2.60	2.17
Armidale-Dumaresq	2.16	2.99
Nundle	2.10	1.68
Manilla	2.01	2.43
Newcastle	1.59	1.37
Lake Macquarie	1.56	1.79
Hastings	1.20	1.82
Dubbo	1.22	1.27
Other NSW	29.67	32.19
Rest of Australia	11.85	14.52

Source: Australian Bureau of Statistics (1989, 1994, 1999, 2003).

TABLE 3. Migration flows between the 'sponge cities' of Tamworth and Dubbo and adjacent local government areas (LGAs), 1986–1991

	Net migration	% Out-migration from LGA to 'sponge city'
Flows between Tamworth and:		
Parry	−431	31.1
Nundle	153	28.5
Walcha	44	7.4
Uralla	7	2.7
Manilla	52	16.7
Gunnedah	96	8.1
Quirindi	150	15.7
Flows between Dubbo and:		
Coonamble	88	11.7
Coonabarabran	27	4.0
Gilgandra	42	16.5
Coolah	69	10.2
Mudgee	46	4.3
Wellington	155	19.4
Cabonne	54	3.4
Parkes	70	5.9
Narromine	22	17.4
Warren	32	10.1
Bogan	103	16.6
Lachlan	42	3.9

Source: Australian Bureau of Statistics (2006).

'laws' of human migration. For instance, one of Ravenstein's laws states that each current of migration will be more or less matched by a counter-current. Analysis of contemporary Australian internal migration basically confirms this 'law' (Bell & Hugo 2000). The widespread tacit reproduction of the sponge city concept bears testament to the superficial plausibility of the 'sponge' metaphor as a descriptor and explanandum of the recent economic and demographic trends involving Australia's regional centres and their hinterlands, rather than any rigorous empirical analysis of the same.

Perhaps the attractiveness of the idea of 'sponges' derives from the popularity of metaphors generally. After all, the literature on 'sponge cities' reviewed in the present paper has drawn on a number of (frequently hydrological) metaphors including tides, swimming, dams, deserts, and gravitation, as well as the sponge itself. This is not surprising because metaphors have a central and indispensable role in scientific thought and communication, as well as everyday parlance (Sayer 1992). This is particularly the case in the social sciences. The epiphenomena of the so-called real world in which social scientists are intrinsically enveloped—and yet from which they seek to abstract—are too complex for them to succinctly and meaningfully comprehend its totality, let alone communicate this to others. Social scientists, like people generally, cope with information overload by building up simplified images in their minds—and then often discussing the world in terms of those images rather than reality itself (Downs & Stea 1973; Walmsley & Lewis 1993). Metaphors aid in the communication of scientific facts and ideas through

TABLE 4. Migration flows between the 'sponge cities' of Tamworth and Dubbo and adjacent local government areas (LGAs), 1996–2001

	Net migration	% Out-migration from LGA to 'sponge city'
Flows between Tamworth and:		
Parry	−313	34.6
Nundle	48	28.6
Walcha	40	7.8
Uralla	4	2.73
Manilla	103	16.7
Gunnedah	176	10.5
Quirindi	113	15.6
Flows between Dubbo and:		
Coonamble	137	16.6
Coonabarabran	45	6.3
Gilgandra	82	20.4
Coolah	116	14.5
Mudgee	40	2.9
Wellington	104	17.7
Cabonne	24	3.1
Parkes	75	4.7
Narromine	150	21.6
Warren	43	11.1
Bogan	37	10.1
Lachlan	50	4.3

Source: Australian Bureau of Statistics (2006).

the creation of 'pictures' within an audience's mind of the reality being discussed. In other words, scientific metaphors operate not by attempting to describe the scientific phenomenon under study itself, but by translating an understanding of it into a picture form that is more readily absorbed by the non-specialist mind (Sayer 1992). As Rorty (1980, p. 12) observed, 'It is pictures rather than propositions, metaphors rather than statements, which determine most of our philosophical convictions'.

Barnes (1997) distinguishes between big and little scientific metaphors. 'Little' metaphors tend to be minor figures of speech, such as migration 'flows'. In contrast, big metaphors are sufficiently popular, persuasive, and intellectually robust to form the impetus for major research programs. Examples may include Smith's hidden hand of the market (1937), gravity models of human migration and economic behaviour and—Barnes' nominated favourite—geological strata in Massey's spatial divisions of labour. It is not that people and money actually move about like objects under the influence of gravity, or that disaffected, underemployed workers and empty factories actually form substrata like a seam of coal or a bauxite deposit. Nevertheless, according to the calculus of micro-economics, they do appear to be drawn to centres of greater mass and form depositories of latent potential for the next round of accumulation, respectively.

Obviously, metaphors carry more than just a picture of reality: they are epistemological and pedagogical packets, kernels of other people's interpretations of a complex reality, coloured by the cultural and political presuppositions of the

TABLE 5. Migration effectiveness ratios for flows to Dubbo and Tamworth from their respective surrounding local government areas (LGAs), 1986–1991 and 1996–2001

	Migration effectivene cities	
LGA	1986–1991	1996–2001
Gunnedah	27	46
Manilla	21	42
Nundle	50	25
Parry	–23	–15
Quirindi	56	46
Uralla	10	5
Walcha	39	41
Bogan	61	29
Cabonne	52	20
Coolah	47	67
Coonabarabran	35	31
Coonamble	47	61
Gilgandra	19	30
Lachlan	55	52
Mudgee	28	22
Narromine	6	28
Parkes	34	31
Warren	28	33
Wellington	33	19

original author. This is what Barnes (1997, p. 232) is referring to when he states that:

> ... metaphors are never innocent: they represent a particular slant on the world, albeit often multi-layered and submerged. For this reason it is necessary to inspect critically the metaphors that form the basis of the enquiry, checking them for their implicit politics, hidden assumptions, and their logical coherence, consistence and compatibility.

Like all metaphors, the 'sponge city' notion is not an impartial picture of demographic and locational reality. Although there is evidence to support the idea that many regional centres have gained public and private services at the expense of nearby smaller towns over recent decades, this itself is scale dependent, as the foregoing analysis reveals. Many of the famed 'sponge cities' growth trajectories actually conform to fairly standard Myrdalian regional development ideas of spread effects (again a metaphor!) in that service and population growth in the cities' penumbral zone has effectively swallowed up former small towns in radial ribbons of residential and industrial strip development. Backwash effects—where population and non-farm business activity has been drawn from the hinterland to the centre—tends to affect more distant regions, although this, too, is difficult to prove conclusively.

More troublingly though, and bearing out Barnes' remarks about the importance of staying alert to the political orientations of metaphors, the sponge city notion has been used for socially regressive political ends. In a submission to the 1998 Federal Parliamentary Inquiry into Regional Banking Services, the consulting group KPMG produced a submission on behalf of the Australian Bankers' Association (ABA) that

TABLE 6. Proportions of 'pool' shire population in out-migration flows to Tamworth and Dubbo, 1986–1991 and 1996–2001 (per cent)

Shire	1986–1991	1996–2001
Proportion of population going to Tamworth:		
Gunnedah	3.90	2.17
Manilla	4.22	5.53
Nundle	11.50	9.00
Parry	2.72	7.51
Quirindi	4.00	3.69
Uralla	0.72	0.66
Walcha	2.33	2.15
Proportion of population going to Dubbo:		
Bogan	3.73	2.49
Cabonne	0.70	0.59
Coolah	2.55	3.85
Coonabarabran	0.71	1.34
Coonamble	2.42	3.75
Gilgandra	2.60	3.70
Lachlan	0.73	0.98
Mudgee	0.71	0.65
Narromine	3.11	5.26
Parkes	0.99	1.04
Warren	2.01	2.64
Wellington	3.48	3.73

Source: Australian Bureau of Statistics (2006).

argued that a new dynamic of regional population change was in evidence—one in which services and population were being drawn into major regional centres 'with critical mass' from surrounding areas (KPMG Management Consulting 1998). Hence, the sponge city model was used as the rationale for the withdrawal of branch banking services from small rural service centres, a pattern that did, indeed, eventuate during the late 1990s (see Argent & Rolley 2000a,b). Yet, as Argent and Rolley (2000a) argued, and as is demonstrated in the present paper, the demographic realities of regional migration trends are much more complex than this. Many of the towns that lost bank branches during this period had, in fact, grown in population, with many able to justify the reopening of full branch banking services with alternative financial institutions, such as credit unions or the Bendigo Bank's community bank model. In Sayer's (1992) terms, then, the 'sponge city' is a dead metaphor because the reality that it seeks to encapsulate simply does not fit the picture conjured up for it: to put it bluntly, there is too much slippage between the sign and the signified.

At a more logical level, the sponge city metaphor is a product of what Sayer (1992, pp. 153–154) terms the twin problem of induction and causation. As noted above, Salt conceived of the 'sponge city' idea through the recognition of two phenomena: drier, inland regions were losing population while, simultaneously, some regional centres were recording relatively high population growth rates. It is important to recognise that the second observation is not necessarily a logical outcome, or product, of the first.

Conclusion

In the rapidly evolving and, some would argue, bifurcating space economy and settlement structure of regional Australia, the notion of 'sponge cities' has captured widespread lay and academic interest for its ability to summarise in one simple metaphor the contrasting trends of regional 'command centres' and their declining hinterlands. Our purpose in the present paper has been to subject the 'sponge city' idea to some long overdue critical and empirical scrutiny. Our analysis of inter-regional migration trends for two intercensal periods covering the late 1980s to the early 1990s and the late 1990s to the first years of the new millennium shows that both archetypal 'sponge cities' (Tamworth and Dubbo) have, indeed, grown in population from 1986 to 2001 and that many (although by no means all) 'pool' shires have experienced net population loss over the same period. However, it does not follow that the demographic growth of these regional centres is substantially attributable to net migration gains from the hinterlands. Instead, the greatest sources of in-migrants for these centres are Sydney (even though the latter's role as a supply source has declined over time), other regions in New South Wales, and the rest of Australia. Out-migrants from the shires surrounding these centres make up only a tiny proportion of Tamworth's and Dubbo's in-migration gains. This said, we must be careful not to overstate our argument.

The internal migration data used for the present paper is the most reliable publicly available source for measuring the volume as well as the origins and destinations of migrants. Nonetheless, we have no way of knowing the number of ex-Sydney migrants to Tamworth and Dubbo who are, for example, return migrants or the proportion of former hinterland residents who eventually became 'sponge city' in-migrants via a series of inter-regional moves. Equally, the nature of the population interchanges between regional centres and remoter (as opposed to pool) shires has not been considered here; yet, in the case of Aboriginal mobility (see Burns 2006), substantial and highly complex flows occur between these locations. There is an urgent need for a better understanding of both the actual temporal and spatial complexity of migration for all cohorts and socioeconomic and ethnic groups within regional Australia in this context.

However, overall we are left with the strong impression that inter- and intraregional migration trends are highly complex spatially, and certainly far too dynamic to be plausibly encapsulated by the 'sponge city' metaphor. This is not to say that regional centres, such as the two considered in the present paper, have not drawn to them public and private sector goods and services once based in hinterland towns further down the hierarchy. They clearly have. The great problem with the 'sponge cities' metaphor is that it both naturalises inherently political processes, such as the increasingly neoliberal philosophy of service provision embraced by both governments and corporations that has seen many service points withdrawn from smaller country towns, and obfuscates highly complex demographic and capital flows at the inter- and intraregional scales, as in the case of the migration flows considered in this paper.

Therefore, we argue that apparently innocent literary devices, such as metaphors, need to be used carefully. Although absolutely central to virtually all forms of theorising, we should be mindful of the potential use and abuse of metaphors, particularly where they are used to naturalise events and processes that are substantially social in character and potentially politically regressive.

Metaphors not only structure our view of the world, they also strongly influence our interventions in it.

Correspondence: Neil Argent, Division of Geography and Planning, University of New England, Armidale, NSW 2351, Australia. E-mail; nargent@une.edu.au

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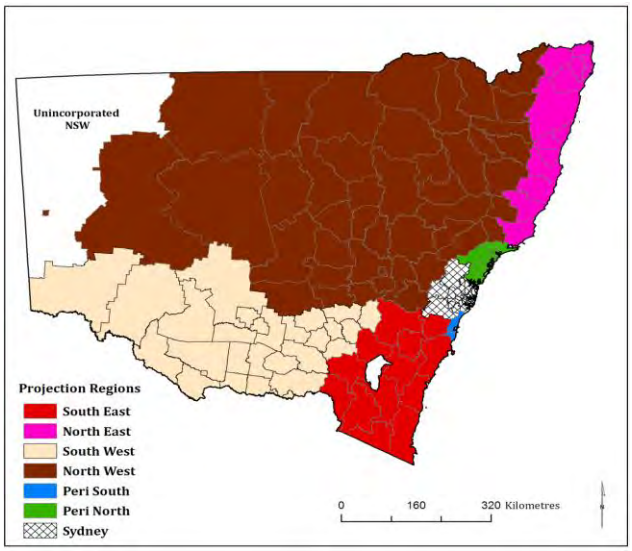
The Movement of People in Regional New South Wales, 2006-2011

Assoc. Prof. Neil Argent
Division of Geography and Planning
University of New England
Armidale, NSW, 2351

Executive Summary

- As commissioned by NSW Planning and Infrastructure's Demography Unit, this report aims to:
- Describe the major factors influencing local economic change in non-metropolitan New South Wales; and
- Identify the key drivers of net migration for non-metropolitan LGAs in that State for the 2006-2011 intercensal period.
- The New South Wales study area, including its constituent local government areas (LGAs), the key spatial unit employed in this project, is shown in Fig. 1 below. Also shown on this map are the seven regions used by the Demography Unit in its population projection modelling.

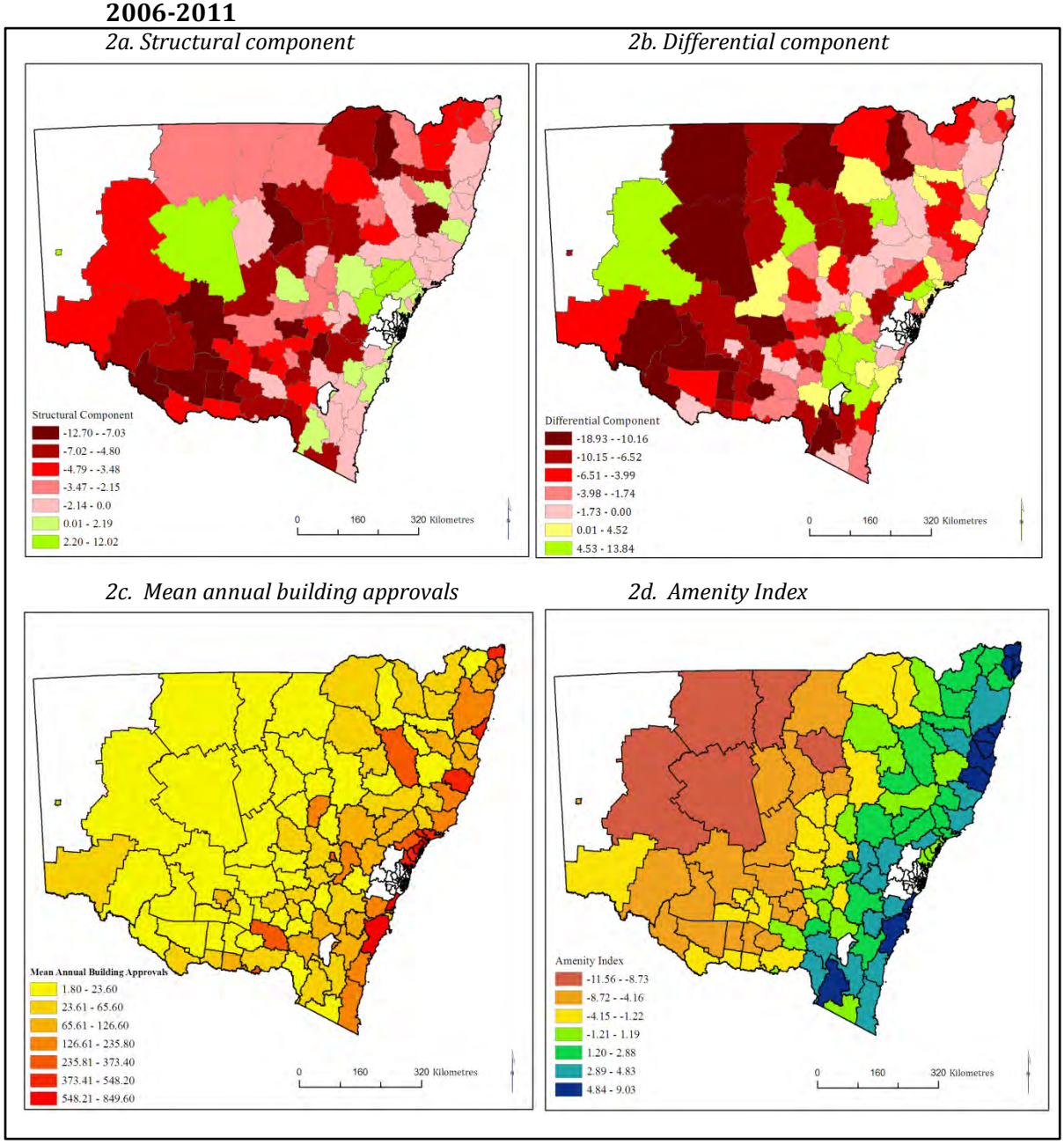
Fig. 1. New South Wales, showing Local Government Areas and Projection Regions



- The research updates earlier work conducted by the author for the Demography Unit in 2010, which focused on non-metropolitan inter-regional migration trends and processes for the 2001-2006 intercensal period. However, at the Unit's request, this report also geographically expands the focus of this earlier research by incorporating the peri-metropolitan regions to the north and south of Sydney into the analysis, and extends the analysis by providing a means by which the research results can be incorporated into the Department's population projection model.
- In order to replicate the earlier study, the same set of independent variables were employed but updated with 2006-2011 data. These are: the ***structural component*** and ***differential component*** from shift-share analysis, the number of ***building approvals***, averaged over a five year period, and Argent et al.'s (2007) ***amenity index of rural Australia***. Fig. 2 shows the spatial distribution of the four independent variables.

- Although the focus of this report is the identification of a set of robust predictors of **net migration** in non-metropolitan NSW SLAs both **in-** and **out-migration numbers** (**and rates**) (see Figs. 3, 4 and 5) are explicitly and separately included in the following analysis as dependent variables. Overall, it is hypothesised that the four independent variables outlined above will be strong positive predictors of all migration flows, including net migration, across the non-metropolitan LGAs of New South Wales. Where migration rates are presented throughout this report, the 'at risk' population was the mid-period (e.g. mid-2008 for the 2006-2011 intercensal period) total population.

Fig. 2. Spatial distribution of the four independent variables, New South Wales, 2006-2011



- In-migration flows are highest in the Hunter and Illawarra regions, the Mid-North, Far North and South Coast regions and major regional centres such as Wagga Wagga, Orange, Bathurst and Tamworth. LGAs with low in-migration numbers tend to be located in the more sparsely settled, more remote and agriculturally-dependent regions.

LGAs exhibiting the highest rates of in-migration are located along the Murray River (i.e. the NSW/Vic. border), the Southern Tablelands adjacent to Canberra (e.g. Palerang, Yass Valley and Queanbeyan), the Mid-North Coast and Newcastle. Out-migration numbers are to some extent positively associated with population size.

Fig. 3. In-migration numbers and rate, non-metropolitan New South Wales, 2006-2011

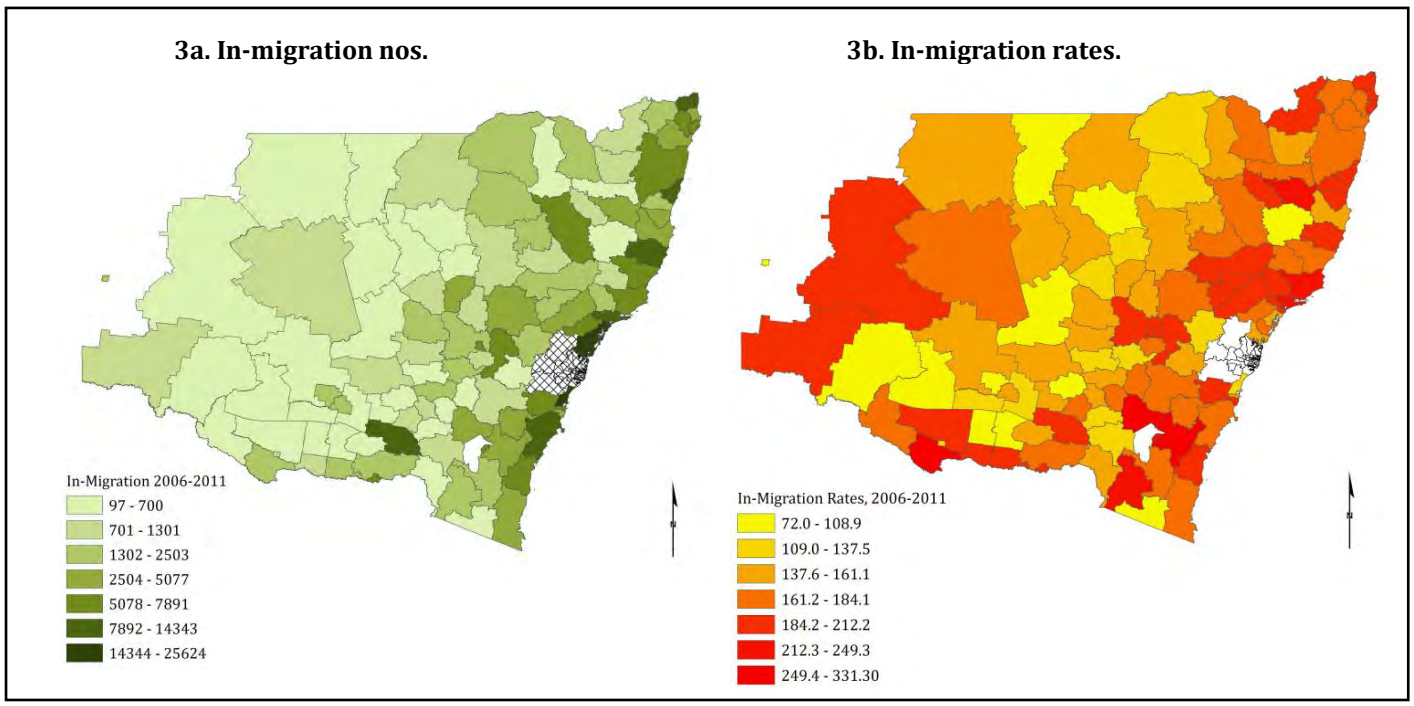
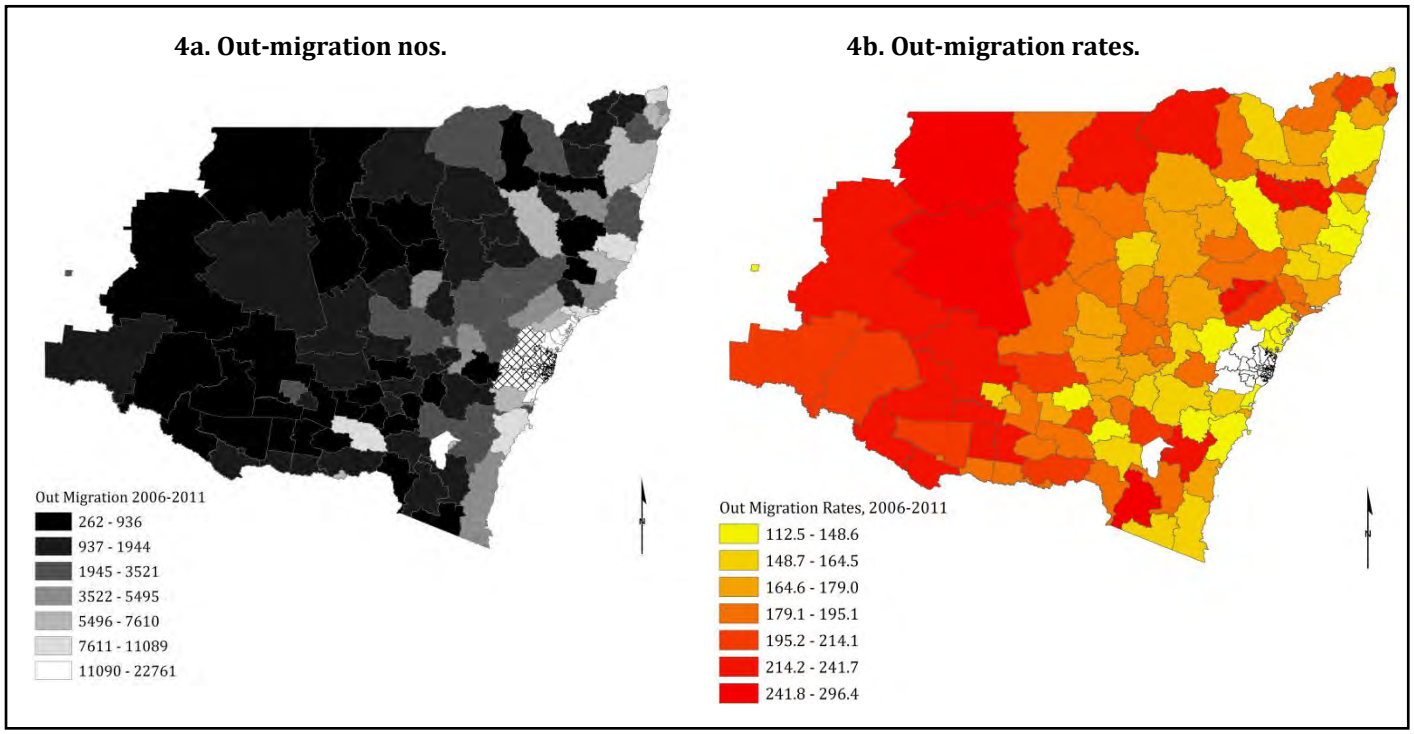


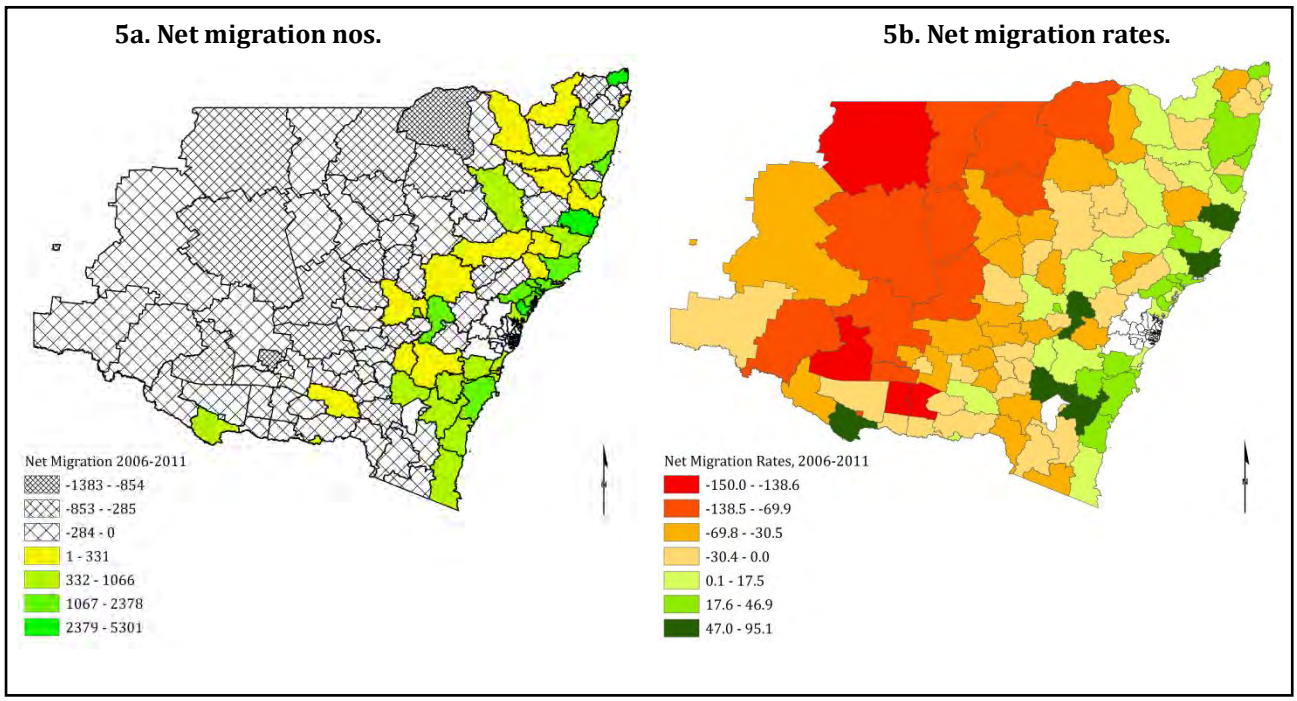
Fig. 4. Out-migration numbers and rate, non-metropolitan New South Wales, 2006-2011



- High out-migration rates tend to be associated with the more remote, drier (measured by lower annual average rainfall) and broadacre agriculture-dependent shires. Armidale-Dumaresq, Uralla, Palerang and Byron can be considered outliers in this sense.

- Figs. 5a and 5b depict net migration flows (numbers and rates respectively). Fig. 5a reveals that much of non-metropolitan NSW 'west of the Divide' experienced net migration losses over the 2006-2011 intercensal period. The highest net migration gains are found along the north and south coasts, in and around major regional centres and Sydney's peri-metropolitan fringe and along the Vic./NSW border. Fig. 5b paints a similar picture to that of Fig. 5a, with the highest net migration rates occurring along the littoral fringes, the peri-metropolitan zone, surrounding major inland regional centres.

Fig. 5. Net migration numbers and rate, non-metropolitan New South Wales, 2006-2011



- Correlation testing of the associations (or lack thereof) for the full suite of independent and dependent variables at the LGA scale revealed that there was little intercorrelation within the set of independent indicators with the exception of large correlation co-efficients between mean annual building approvals and the amenity index.
- Simple correlation testing was conducted between all independent and dependent variables at the LGA scale, with the 'normalised' versions of the mean building approvals, in-migration and out-migration (numbers) variables used. Pearson's product moment correlation coefficient measures the linear association of two variables, with results varying between -1 and +1 (the closer the coefficient is to -1 or +1, the stronger the relationship, negative or positive respectively). Overall, the independent variables were strongly correlated with the various migration indicators with only one of the twenty four co-efficients not significant at the 99.9% level of confidence.
- The strongest relationships between the independent and dependent variables are for migrant numbers rather than the standardised migration rates. Across all the migration types, the mean annual building approvals variable produced the largest co-efficients of all the independent indicators, followed by the structural component, the amenity index and finally the differential component.
- Relative to the 2001-2006 results, three of the four coefficients are stronger, with the exception of the differential component x net migration rates. These results indicate the continued reliability of the predictive migration model.
- Multiple regression testing revealed that the model is a very powerful predictor of in- and out-migration numbers, explaining at least ninety per cent of the variance in those flows over the 2006-2011 intercensal period. The model's predictive capacity declines

somewhat when applied to the migration rates, which are a standardised measure, but still explains over a quarter of the variance in both in- and out-migration rates. For net migration, this relationship is reversed somewhat, the model proving to be a more powerful predictor of the net migration rate – explaining two-thirds of its variance – than of net migration numbers. The average building approvals variable is by far the most robust predictor of crude migration flows (in and out) but much less so for the migration rates.

- To assess whether or not the relationship between the independent variables and migration processes are temporally lagged; that is, that changes in, for example, the number of building approvals could be expected to affect in- and/or out-migration flows some years later, the 2001-2006 value for annual average building approvals were tested against in- and out-migration numbers, 2006-11 in a multiple regression analysis. The multiple R and R^2 results were virtually identical to those in the earlier iteration of testing, thus disproving any statistically significant lagged effects.
- Taking heed of the inherent spatial biases within the data, geographically-weighted regression (GWR) analyses were performed on the same database using the functionality within ESRI's ArcMap software. Comparing the global OLS regression and GWR results it is clear that the R^2 results for in- and out-migration flows (numbers) are virtually identical. For net migration, GWR returned a higher R^2. Further, the Moran's I scores indicate virtually no or, at most, very little spatial autocorrelation in the relationships modelled by GWR. Taken together, these points confirm that the independent model is indeed a powerful and robust predictor of inter-regional migration flows across non-metropolitan New South Wales.
- The predictive model of inter-regional migration was also applied to the six non-metropolitan projection regions used by the Demography Unit in its own projections for modelling purposes.
- In an attempt to overcome the statistical testing problems associated with the small number of cases in each of the Peri-North and South regions, the two were combined and the statistical modelling re-run. Overall, the peri-Sydney region exhibits favourable industry structures (positive structural component) and competitive local businesses (positive differential components), buoyant housing markets (relatively high building approvals numbers) and attractive local environments (relatively high amenity index scores). Not surprisingly, peri-Sydney is a region of substantial net migration gain.
- Simple correlation testing of the independent predictive model and regional migration currents for 2006-2011 revealed that mean building approvals are strongly and positively correlated with in- and out-migration flows for the peri-Sydney region. The differential component is also positively associated with net migration rates, while the amenity index is, puzzlingly perhaps, significantly but negatively associated with in- and out-migration numbers.
- Linear regression testing of the independent predictive model and migration flows to and from the peri-Sydney region for the 2006-2011 intercensal period reveal that it explains a very high proportion of the variance in in- and out-migration numbers but less so for net migration numbers. The beta coefficients display that it is building approvals that contribute most to this result.
- The North West region has, on average, local economies that exhibit unfavourable industry structures, relatively low annual building approval numbers and low amenity scores. On average the region's LGAs experienced net migration losses, though the high standard deviation scores indicate that there is quite a degree of variability across the region with regard to migration flows. Correlation and linear regression testing show that the general predictive model developed for the research applies equally well to the North West as it does to the entire NSW non-metropolitan study area. The model is extremely good at explaining in- and out-migration flows but less adept at explaining net

migration. As with the whole-of-study-area modelling, the building approvals indicator is by far the most influential indicator of the suite.

- The South-West's relatively heavy dependence on agriculture is reflected in its negative mean and median structural component scores, while declining human capital – related strongly to out-migration loss, net out-migration and structural ageing – are likely key contributing factors to a strongly negative differential component. Annual mean building approvals are also relatively low, as are the amenity index scores. Correspondingly, perhaps, the South West had negative mean and median net migration (numbers and rate). The correlation testing of the predictive model against internal migration for the South West region reveals that mean annual building approvals are most strongly associated with in- and out-migration flows, followed by the structural component and the amenity index. The independent model is also a powerful predictor of in- and out-migration currents in the South West, and the mean annual building approvals indicator is, by some considerable margin, the dominant variable. The model does not predict net migration numbers with any degree of precision.
- Despite generally negative structural component scores, reflecting unfavourable local economic bases, the South East is a region of quite strong net migration gains. Not surprisingly, given its coastal orientation together with the rugged, iconic landscapes of the Southern Highlands, the South East has relatively high amenity index scores. Correlation testing underscores the strong association between mean annual building approvals and migration flows established in the other non-metropolitan regions. The structural component is also strongly related to in- and out-migration in the 2006-2011 period. The other two indicators appeared to be largely unrelated to migration trends in the South East. Multiple regression testing of the independent model against migration flows produced by now familiar results in that the former is a very powerful predictor of the latter, and that mean annual building approvals is the dominant explanatory variable, statistically speaking.
- The descriptive statistics for the North East region show that, on average, its LGAs exhibit unfavourable economic bases, in spite of relatively high building approvals numbers and high amenity index scores. Of course, the high building approvals data is related to the relatively large average in-migration flows and net migration gains seen in the region. In fact, the North East exhibited the highest average net migration rate of any of the non-metropolitan regions considered in this report. The results of correlation tests between the four independent variables and migration flows and rates are similar to those for many of the other regions in that annual average building approvals are most strongly correlated with migration, followed by the structural component and then the amenity index. Linear regression testing showed that the model explained almost all of the variability associated with in- and out-migration flows. The independent model also proved to be a very good predictor of net migration numbers, explaining nearly two-thirds in the variability within the indicator.
- As a final step in the research, the results of the current project were compared with that conducted by Argent and Rolley (2010) for the 1996-2006 period. Given that Argent and Rolley's (2010) research restricted its focus to potential predictors of net migration *only*, Table 26 below sets out the results of multiple regression testing of the predictive model and net migration rates for the three intercensal periods of 1996-2001, 2001-2006 and 2006-2011.
- The results suggest that the model's predictive power is steadily increasing over time, the R^2 results indicating that the model explained fully two-thirds of the variance in net migration rates across regional NSW in the 2006-2011 intercensal period, up from less than half (c. 44 per cent) in the 1996-2001 intercensal period. The beta coefficients indicate some internal instability within the model, though, with no single indicator standing out as a robust predictor of net migration change across the fifteen year period considered above. A perhaps more reliable test of the model would involve in-and out-

migration numbers; unfortunately these two variables were not used in the earlier research and were therefore not available for this step of the current project.

- In the process of statistical testing some key lessons were learnt about the independent model itself. While correlation analysis showed that all independent variables were statistically significantly related with the migration measures, the linear and geographically weighted regression testing revealed that one variable above all others – mean annual building approvals – is responsible for the vast majority of the model's explanatory power. Therefore, in accordance with the principles of economy in explanation it could make sense to use this single measure in future projection models rather than the full predictive set of indicators.