

Paper delivered at the 10th Biennial Conference of the

Australian Population Association

POPULATION AND GLOBALISATION:

AUSTRALIA IN THE 21ST CENTURY

Melbourne 28th November to 1st December 2000

Melbourne Australia

Migration to (and from) "sponge cities": Dubbo and Wagga Wagga as case studies

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Introduction

There has been concern expressed recently in the media about population decline in inland areas of Australia. An example is from October 2000 when, under the heading "Rural population to plunge in Great Dividing drain", the *Sydney Morning Herald* wrote that "rural NSW will continue to suffer dramatic falls, with some communities expected to lose more than 60 per cent of residents" (Murphy 2000).

There has been considerable study of population trends and migration patterns in New South Wales and other States at the aggregate region level. Nugent (1998) notes that the annual population growth rate of inland New South Wales fell to 0.03 per cent in the 1991 to 1996 period, and explores the patterns of internal migration to and from the region during this period. Culpin, Nugent and Truscott (2000) note that the population of inland New South Wales is projected to fall by about 5 per cent over the thirty years from 1996 to 2026.

However these patterns of population change are not uniform across all inland areas. McKenzie (1994, pp. 45-46) discusses the effects of the "urban field" on rural depopulation, noting that greater individual mobility has led to an increased concentration of services, employment and population in major regional centres. Bell (1995, p. 159) observes that a large part of the outflow from inland areas "is directly supporting the growth of regional service centres" and that "in the interior ... the dominant impetus is towards increasing concentration and centralisation of population".

Salt (1996, p. 6) has termed these growing regional centres "sponge cities", commenting that they "appear to be absorbing some of the demographic excess of outlying rural areas".

This paper uses unpublished internal migration data from the 1996 Census to explore the patterns of population movement to and from two of the major regional centres in New South Wales - Dubbo and Wagga Wagga. It examines both the origin and destination of internal movers and their age and sex distribution.

The selected centres

Wagga Wagga and Dubbo are two of the largest, and most rapidly growing, regional centres in inland New South Wales. Both centres are consistently included in any list of the "sponge cities" in Australia (e.g. Salt 1996, Bell 1995). While they have many similarities in their role as regional centres for different parts of the State, they also have important differences in their industry structure and availability of services, particularly higher education, which may lead to significant differences in internal migration patterns to the two centres.

Dubbo is located 415 kilometres north west of Sydney, at the crossroads of the Mitchell Highway, the main road from Sydney to the north west and west of the State, and the Newell Highway, the main inland road from Melbourne to Brisbane. It is the main regional centre for the Orana or North Western region of the State.

Wagga Wagga is a similar distance (462 kilometres) south west of Sydney. It is located on the Sturt Highway, the main Sydney to Adelaide route, a short distance from its intersection with the Hume Highway from Sydney to Melbourne. The main Sydney to Melbourne railway also passes through Wagga Wagga. It is the main regional centre for the Riverina or Murrumbidgee region of New South Wales. Figure 1 shows the location of Dubbo and Wagga Wagga.



Figure 1 – Location map

At June 1999 the Statistical Local Area (SLA) of Dubbo (C) had an estimated resident population of 37 500, while the Wagga Wagga (C) SLA had 56 300 people (Australian Bureau of Statistics 2000).

Both Dubbo and Wagga Wagga SLAs include large rural areas as well as the main urban centre. The Dubbo SLA extends between 20 and 40 kilometres from Dubbo, while Wagga Wagga SLA extends between 15 and 50 kilometres from the centre. However at the 1996 Census 82 per cent of the population of Dubbo SLA was in the Dubbo urban centre, while 77 per cent of the Wagga Wagga SLA population was in the urban centre. It is likely that much of the rural population commutes to employment in the urban centre. All subsequent data in this paper is for the SLAs of Dubbo (C) and Wagga Wagga (C).

Both Dubbo and Wagga Wagga have a concentration of employment in service industries, with retail trade being the biggest employer in both centres. An important difference in the employment profile of the centres, which may impact on migration patterns, is that Wagga Wagga is a major defence centre, with 1914 people (7.8 per cent of the employed labour force) employed in defence in 1996. Thus many of the people moving to Wagga Wagga may do so due to defence force transfers. There

were only 11 people employed in defence counted in Dubbo in 1996. (Source: Australian Bureau of Statistics 1998a.)

Wagga Wagga is also a major centre of higher education, with a major campus of Charles Sturt University located there. At the 1996 Census there were 2175 full-time students at university or other tertiary educational institutions counted in Wagga Wagga. While Dubbo now also has a campus of Charles Sturt University, it is recently established and has only a small number of students. There were only 49 full-time university students counted in Dubbo in the 1996 Census. (Source: Australian Bureau of Statistics 1998a.)

Table 1 below shows a comparison of key statistics for Dubbo and Wagga Wagga.

Table 1 - Key statistics for Dubbo and Wagga Wagga

	<i>Dubbo (C)</i>	<i>Wagga Wagga (C)</i>
Population (June 1999)	37 500	56 300
Urban centre population (1996 Census)	30 102	42 848
% in main urban centre	82%	77%
SLA area	3 339 km ²	4 886 km ²
Road distance from Sydney	415 km	462 km
Employment in retail trade	2 845 (18.3%)	3 802 (15.4%)
Employment in defence (1996)	11 (0.0%)	1 914 (7.8%)
Full-time university students (1996)	49 (0.1%)	2 175 (3.9%)

Population growth in Dubbo and Wagga Wagga

This section summarises the growth in estimated resident population in Dubbo and Wagga Wagga during the 1990s. This growth is compared with total population increase in the North Western and Murrumbidgee Statistical Divisions respectively to show the extent to which these cities (and their rural hinterlands) are "soaking up" the growth in the region. This analysis is based on the official Statistical Division boundaries as defined by the Australian Bureau of Statistics. The extent to which these accurately reflect the population catchments of the regional centres is addressed later in the paper.

Between 1991 and 1996 the population of Dubbo increased by 2 700 people, an average annual growth rate of 1.5%. The population of the entire North Western Statistical Division (including Dubbo) increased by only 1 700 over the same period. Thus about 160 per cent of the region's population growth was in Dubbo. Estimates since 1996 show that growth has slowed. Between 1996 and 1999 Dubbo's population grew by 1 000 (0.9% pa) while that of the North Western region increased by only 300.

The pattern in Wagga Wagga is similar, although growth has been slower. From 1991 to 1996 the population of Wagga Wagga increased by 1 900, an average annual

growth rate of 0.7%. The population of the entire Murrumbidgee region increased by the same amount (1 900 people) - all net population growth in the region was in Wagga Wagga. Growth in both Wagga Wagga and the Murrumbidgee region has slowed since 1996. Between 1996 and 1999 the population of Wagga Wagga increased by 200 (0.1% pa), while that of the total Murrumbidgee region fell by 200. (Source: Australian Bureau of Statistics 2000, and previous issues.)

Table 2 - Population growth in Dubbo, Wagga Wagga and their regions

	<i>Dubbo</i>	<i>North Western SD</i>	<i>Wagga Wagga</i>	<i>Murrum- bidgee SD</i>
<i>1991 - 1996</i>				
Population increase	2 700	1 700	1 900	1 900
% of increase in major centre	160%		100%	
Average annual growth rate	1.5%	0.3%	0.7%	0.2%
<i>1996 - 1999</i>				
Population increase	1 000	300	200	-200
% of increase in major centre	310%		na	
Average annual growth rate	0.9%	0.1%	0.1%	0.0%
% of region population, 1991	29.3%		36.8%	
% of region population, 1999	31.9%		37.8%	

Technical note on census internal migration data

The remaining analysis in this paper uses internal migration data for the period 1991 to 1996 from the 1996 Census. This data is derived from questions on each person's place of usual residence in 1996 and 1991. This results in a number of limitations:

- The data only tells about the locations at the start and end of the period, but not about any moves in the intervening period.
- Data is only available for people aged five years or more.
- Population characteristics (e.g. age) are as at the time of the Census (1996), not at the time of the move.

This data is derived from special tables compiled by the Australian Bureau of Statistics for the Department of Urban Affairs and Planning (Australian Bureau of Statistics 1998b). The tables contain small random variations to the data in order to protect the confidentiality of individual responses. As a result some totals derived from these tables may differ slightly from the same figure derived from other sources. These variations have no significant effect on the conclusions.

There were a number of cases in the 1996 Census where respondents ticked a box to indicate that they did not move between 1991 and 1996, but gave a different address of usual residence in 1991 and 1996. For this analysis it has been assumed that these people did not move. This assumption may result in some understatement of the number of people changing residence in the 1991 to 1996 period.

Migration rates have been calculated based on the census count, place of usual residence basis, from the 1996 Census, derived from the internal migration tables.

Migration catchments of Dubbo and Wagga Wagga

The first step in the analysis was to determine the "migration catchments" of the selected centres. This was done by determining the gross (not net) movement from each SLA to the selected centre over the 1991 to 1996 period. This was then expressed as a proportion of the 1996 population.

Note that gross rather than net flows were used to determine those SLAs with strong migration links with the selected regional centres. There are some SLAs with strong flows in both directions, resulting in small net flows despite strong migration links.

The result is a continuum from zero movers upwards. While the data was assessed for natural breaks, no such break points were evident. It was decided to use an arbitrary cutoff point - for both Dubbo and Wagga Wagga areas where more than 1 per cent of the population moved to the regional centre in the previous five years were defined as the migration catchment of the centre. The areas thus defined accord well with expectations and with other regional definitions, and provide minimal overlap between the catchments of these and other regional centre catchments. The maps below also indicate those SLAs where more than 2 per cent of the population moved to the centre - this may be regarded as the core migration catchment.

It is worth noting that the numbers are quite small, remembering that these are gross rather than net flows. There were only 8 SLAs where more than 2 per cent of the population moved to Dubbo, and only 10 cases where more than 2 per cent moved to Wagga Wagga. The highest values were 4 per cent of the population of Narromine (287 people) moving to the neighbouring Dubbo SLA, and 9 per cent of the people of Lockhart moving to Wagga Wagga.

Figure 2 below shows the migration catchment of Dubbo in the 1991 to 1996 period. It includes a total of 14 SLAs¹ extending long distances to the west and north west and covering much of the north western part of the State. The small extent of the catchment to the south results from the close proximity of other major regional centres at Orange and Bathurst, while people in areas to the north east are more likely to move to Tamworth.

¹ SLAs in the Dubbo catchment are Bogan, Bourke, Brewarrina, Central Darling, Cobar, Coolah, Coonabarabran, Coonamble, Gilgandra, Lachlan, Narromine, Walgett, Warren and Wellington.

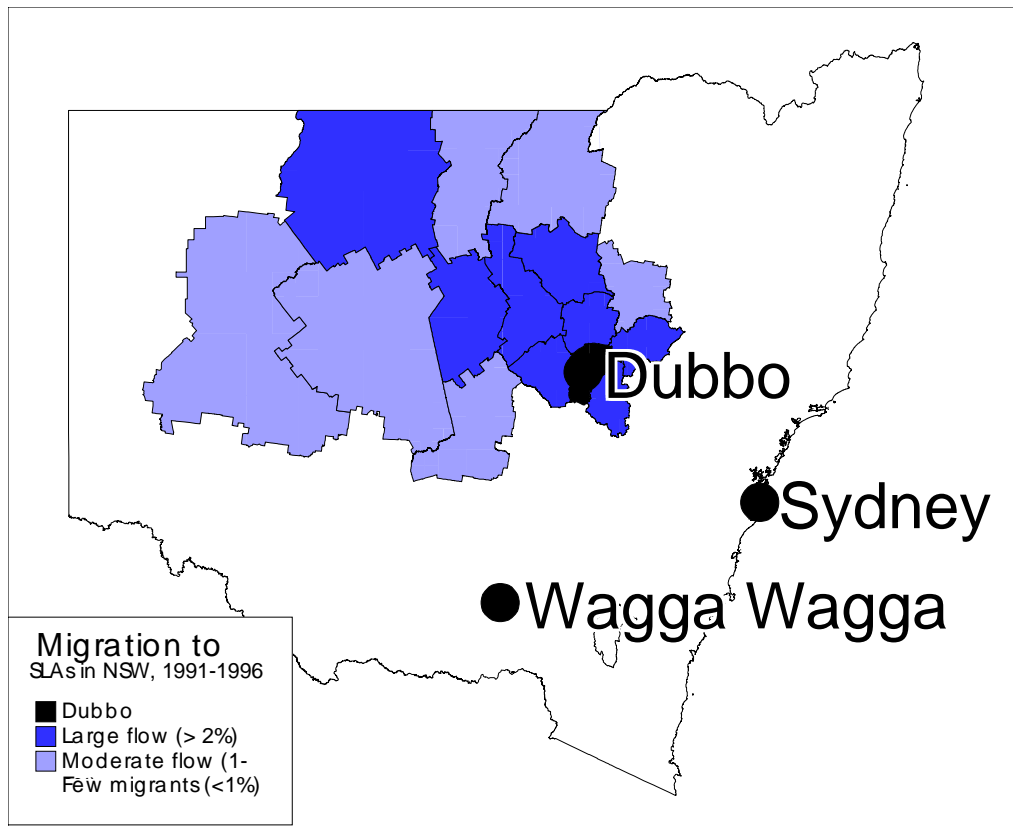


Figure 2 - Migration catchment of Dubbo, 1991-1996

Figure 3 below shows the migration catchment of Wagga Wagga in the 1991 to 1996 period. It includes 23 SLAs² extending up to 300 kilometres to the west and north. The extent of the catchment to the south is much less, due to the proximity of the larger regional centre at Albury-Wodonga and other centres in Victoria. While the catchment extends a considerable distance to the west, the proportions of the population moving to Wagga Wagga are comparatively low. This is due to the alternative attraction of Griffith (1999 SLA population 23 300), a smaller but growing sub-regional centre about 150 kilometres west of Wagga Wagga.

There is a small overlap between the migration catchments of Dubbo and Wagga Wagga, with the SLAs of Central Darling and Lachlan included in both catchments.

² SLAs in the Wagga Wagga catchment are Bland, Carrathool, Central Darling, Coolamon, Cootamundra, Culcairn, Deniliquin, Griffith, Gundagai, Harden, Hay, Holbrook, Jerilderie, Junee, Lachlan, Leeton, Lockhart, Murrumbidgee, Narrandera, Temora, Tumbarumba, Tumut and Urana.

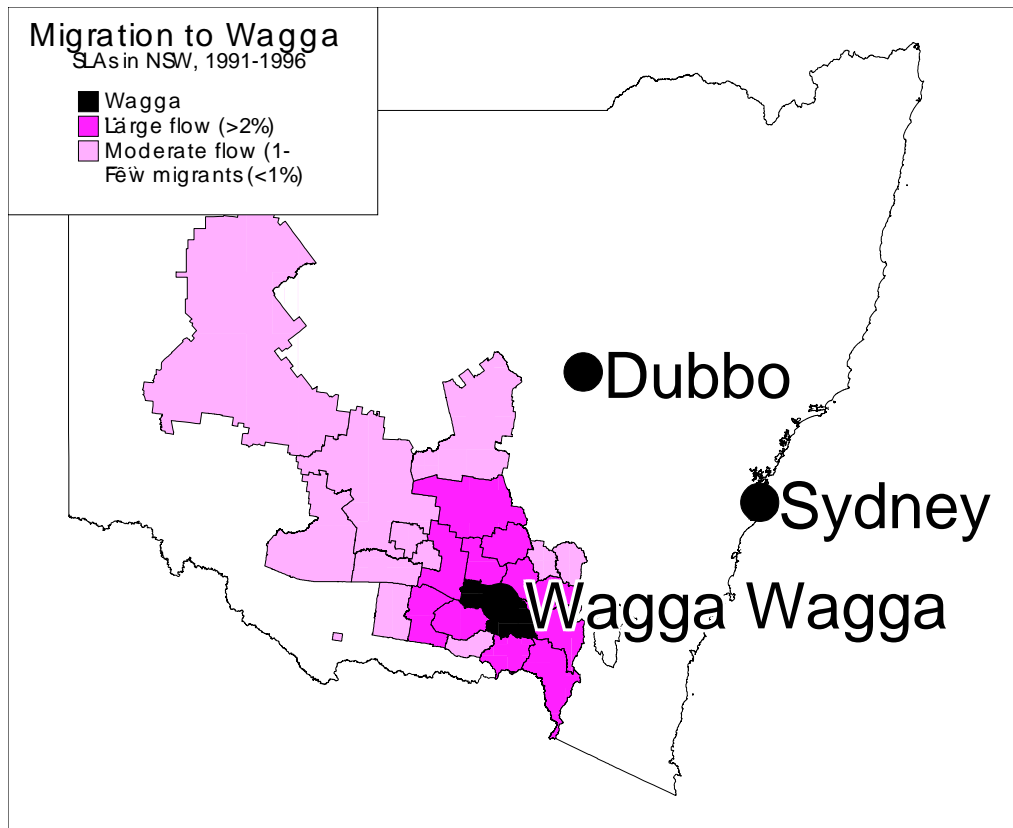


Figure 3 - Migration catchment of Wagga Wagga, 1991 to 1996

Migration to Dubbo from its catchment

In the 1991 to 1996 period, 2 061 people moved from the Dubbo migration catchment to Dubbo. However 1 021 people moved in the other direction, giving a net flow to Dubbo of 1 040 people.

Table 3 - Internal migration flows to Dubbo, 1991 to 1996

<i>Origin/destination region</i>	<i>Moved to Dubbo</i>	<i>Moved from Dubbo</i>	<i>Net flow to Dubbo</i>
Dubbo catchment	2 061	1 021	1 040
Sydney	1 385	1 482	-97
Other NSW	2 559	2 897	-338
Interstate	958	1 683	-725
Total	6 963	7 083	-120

Table 3 shows the distribution of internal migration to Dubbo in the 1991 to 1996 period. It shows that about 30 per cent of the 6 963 people who moved to Dubbo in this period came from the catchment area defined earlier. However the net flow from the local catchment was slightly outweighed by net outflows to other parts of New South Wales (mainly coastal areas) and to other States (mainly Queensland), resulting in a small net internal migration loss from Dubbo. It is of interest that the total net

migration to Sydney was negligible, and the gross flows to Sydney were also smaller than those to other parts of the State (and interstate for out migration).

From this data it is clear that a significant proportion of population growth in Dubbo in the 1991 to 1996 period was attributable to migration from its hinterland or catchment.

It is important to also examine the data from the aspect of the Dubbo hinterland or catchment - what proportion of those moving from the catchment area moved to Dubbo. Table 4 shows migration flows to and from the Dubbo catchment SLAs in the 1991 to 1996 period.

Table 4 - Internal migration flows to Dubbo catchment SLAs, 1991 to 1996

<i>Origin/destination region</i>	<i>Moved to Dubbo catchment</i>	<i>Moved from Dubbo catchment</i>	<i>Net flow to Dubbo catchment</i>
Dubbo	1 021	2 061	-1 040
Sydney	2 672	2 977	-305
Other NSW	4 954	8 558	-3 604
Interstate	2 132	3 733	-1 601
Total	10 779	17 329	-6 550

As Table 4 shows, only 12 per cent of those who moved from the Dubbo catchment in the 1991 to 1996 period moved to Dubbo. Of the net internal migration loss of 6 550 people, only 16 per cent was to Dubbo. Population losses in this region are not due in large part to the "sponge city" of Dubbo soaking up the growth from the region.

The major net migration losses were to other parts of New South Wales and to other States. Of the net losses to other parts of the State, there was a loss of 1 564 people to coastal areas³, 901 to inland regional centres other than Dubbo⁴ and 1139 to other inland parts of the State. It is of interest that only 3 per cent of the net migration loss from this region was to Sydney. Of the net interstate loss, about 80 per cent was to Queensland. Of the total net migration loss from the region, 19 per cent was to Queensland. This may be due to parts of the region adjoining the Queensland border being as close or closer to major Queensland centres such as Toowoomba than to New South Wales centres.

As shown in Figure 4, there was net migration from the Dubbo catchment to Dubbo itself across all age groups. The peak flow is in the 20 to 24 years age group, the most mobile age group, with large numbers of people moving in search of employment or

³ Coastal areas are Hunter, Illawarra, Richmond-Tweed and Mid-North Coast Statistical Divisions and Lower South Coast Statistical Subdivision.

⁴ Inland regional centres are defined as Armidale & Dumaresq SLAs, Tamworth & Parry SLAs, Dubbo SLA, Bathurst-Orange Statistical Subdivision, Wagga Wagga SLA and Albury Statistical Subdivision.

higher education. (Note that the nature of the census data means that people in this age group could have been any age from 15 to 24 at the time of the move.)

As Dubbo at that time had no higher education facilities, it is of interest that almost 350 young people (including the 15 to 19 years age group) moved to the regional centre, presumably motivated by the search for employment and/or TAFE education.

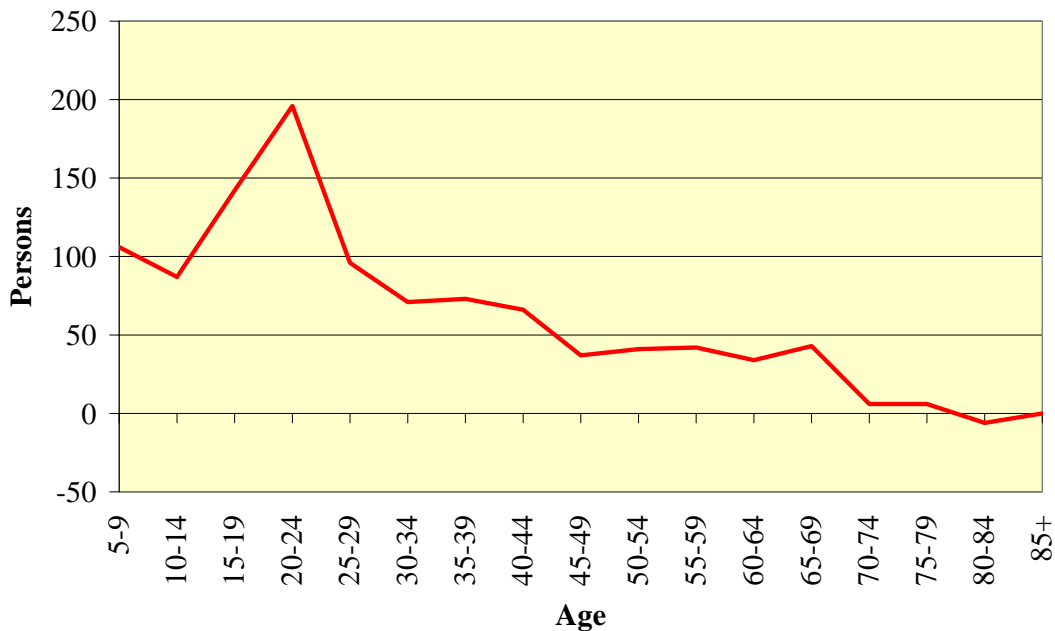


Figure 4 - Age distribution of net migration to Dubbo from its catchment, 1991-96

It is of interest to compare this age distribution with the age distribution of net migration flows from Dubbo to other areas. As shown in Figure 5, Dubbo has a large net internal migration loss of people in the 20 to 24 years age group, the same age at which it attracts people from its own region. It seems from this data that young people are attracted to places with a greater variety of opportunities than their current location. Thus while Dubbo offers an attractive range of opportunities for young people living in smaller centres, this range of opportunities is inadequate to keep young adults of the same age group who already live in Dubbo.

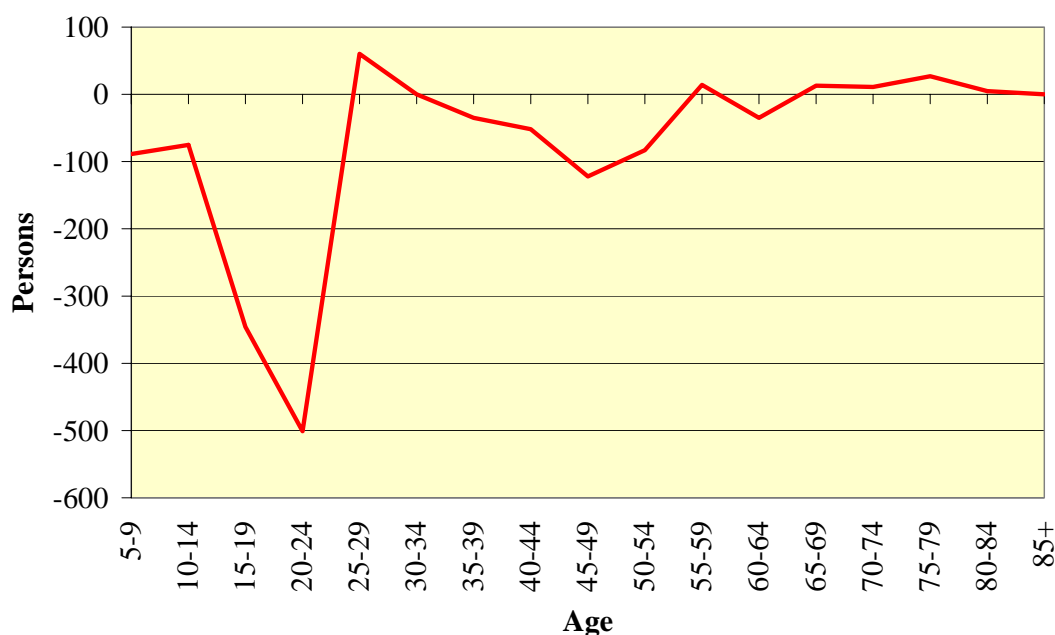


Figure 5 - Age distribution of net internal migration to Dubbo from other areas, 1991-96

Movement to Wagga Wagga from its catchment

During the 1991 to 1996 period a total of 3 367 moved from the Wagga Wagga hinterland catchment to Wagga Wagga. After allowing for return flows of 1 472 people, there was a net migration flow from the catchment to Wagga Wagga of 1 895 people.

Table 5 - Internal migration flows to Wagga Wagga, 1991 to 1996

<i>Origin/destination region</i>	<i>Moved to Wagga Wagga</i>	<i>Moved from Wagga Wagga</i>	<i>Net flow to Wagga Wagga</i>
Wagga Wagga catchment	3 367	1 472	1 895
Sydney	1 816	2 366	-550
Other NSW	2 853	3 036	-183
Interstate	3 936	5 611	-1 675
Total	11 972	12 485	-513

Table 5 shows the distribution of internal migration to Wagga Wagga between 1991 and 1996. A total of 11 972 people moved to Wagga Wagga during this period. Of these only 28 per cent were from the defined catchment area, a similar proportion to that measured for Dubbo. This net inflow from the region was outweighed by net losses to other areas. Unlike Dubbo, there was a fairly large net migration loss from Wagga Wagga to Sydney, while the loss to other parts of the State was smaller. However the largest net migration loss from Wagga Wagga was to other States,

mainly to Queensland and to the Australian Capital Territory. The proximity of Wagga Wagga to the Victorian border also resulted in significant gross flows to and from Victoria. However the net flow was a small gain to Wagga Wagga from Victoria.

As for Dubbo, migration from the hinterland catchment was a significant part of total population growth in Wagga Wagga in the 1991 to 1996 period. Without this migration there would have been a large net migration loss from the city during this period.

The view from the aspect of the Wagga Wagga catchment provides a different perspective of the net migration from the region to the main regional centre. Table 6 shows net migration flows to the Wagga Wagga catchment in the 1991 to 1996 period.

Table 6 - Internal migration flows to Wagga Wagga catchment SLAs, 1991 to 1996

<i>Origin/destination region</i>	<i>Moved to Wagga Wagga catchment</i>	<i>Moved from Wagga Wagga catchment</i>	<i>Net flow to Wagga Wagga catchment</i>
Wagga Wagga	1 472	3 367	-1 895
Sydney	3 348	3 858	-510
Other NSW	6 559	9 347	-2 788
Interstate	5 137	9 347	-2 788
Total	16 516	24 400	-7 884

As shown in Table 6, only 14 per cent of those who moved from the defined catchment area in the 1991 to 1996 period moved to Wagga Wagga. Of the net migration loss from the region of 7 884 people, only 24 per cent was to Wagga Wagga. In each case this is slightly higher than the Dubbo proportion, perhaps due to the availability of higher education facilities in Wagga Wagga. However it is clear that Wagga Wagga is not soaking up the majority of the migration from the region.

Unlike the Dubbo region, there was a moderate net migration loss to Sydney. Even so, Sydney accounted for only 6 per cent of the net migration loss. However this was outweighed by net movements to other parts of New South Wales and to other States. Of the net losses to other parts of the State, there was a loss of 1 462 people to coastal areas⁵ and 1 260 to other inland regional centres⁶ (about half of this to the nearby centre of Albury).

⁵ Coastal areas are Hunter, Illawarra, Richmond-Tweed and Mid-North Coast Statistical Divisions and Lower South Coast Statistical Subdivision.

⁶ Inland regional centres are defined as Armidale & Dumaresq SLAs, Tamworth & Parry SLAs, Dubbo SLA, Bathurst-Orange Statistical Subdivision, Wagga Wagga SLA and Albury Statistical Subdivision.

As in the Dubbo region, migration losses to Queensland were significant, accounting for 45 per cent of the net interstate loss despite the long distance from the region to Queensland. The other major destination was the Australian Capital Territory, with a net loss of 921 people (34 per cent of the total net migration loss), illustrating the important role which Canberra plays as a regional or metropolitan centre for south eastern New South Wales. It was thought that there may also be significant net migration losses to Victoria, given the relative proximity of the range of employment and education opportunities in Melbourne. However the data shows that there were large flows in both directions (2 509 arrivals and 2 634 departures), resulting in a net loss to Victoria from the region of only 125 people.

As shown in Figure 6, there was net migration from the Wagga Wagga catchment to Wagga Wagga itself in all age groups up to ages 55 to 59, similar to the pattern in the Dubbo region. As in Dubbo, the peak was in the ages 15 to 19 and 20 to 24. This peak was slightly more pronounced than in Dubbo, possibly due to the availability of higher education in Wagga Wagga.

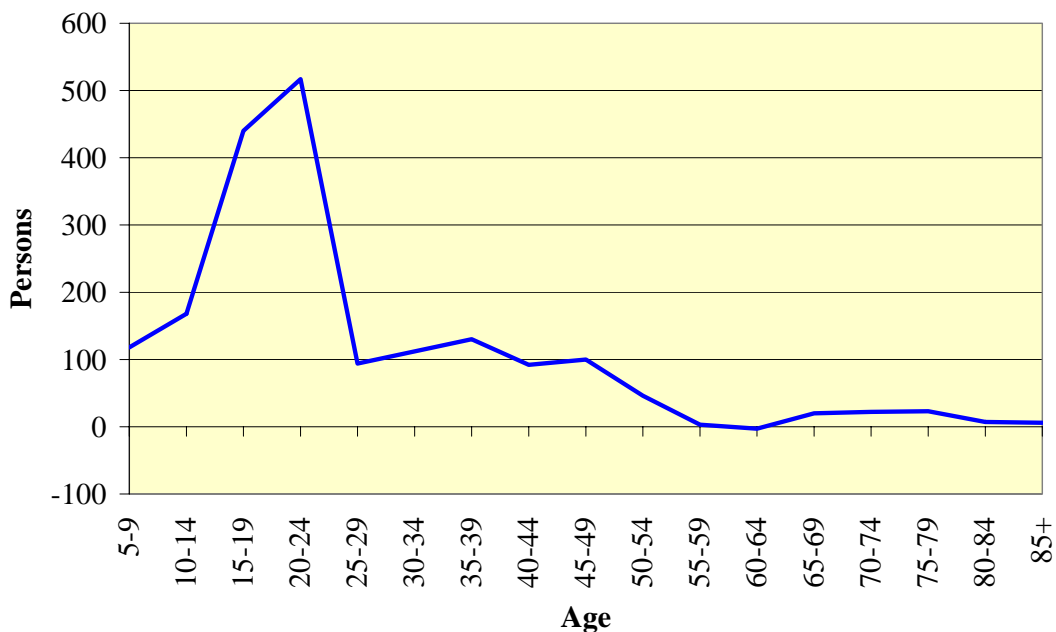


Figure 6 - Age distribution of net migration to Wagga Wagga from its catchment, 1991-96

As Figure 7 shows, the age distribution of net migration to Wagga Wagga from areas other than its hinterland catchment is somewhat different to that for Dubbo. The presence of Charles Sturt University (and possibly the defence facilities) results in a small net inflow in the 15 to 19 years age group. Unlike Dubbo, there is a net outflow in all other age groups. Despite the availability of higher education, the largest net loss is in the 20 to 24 years age group. As in the case of Dubbo, this is the same age group which is most attracted to Wagga Wagga from the hinterland.

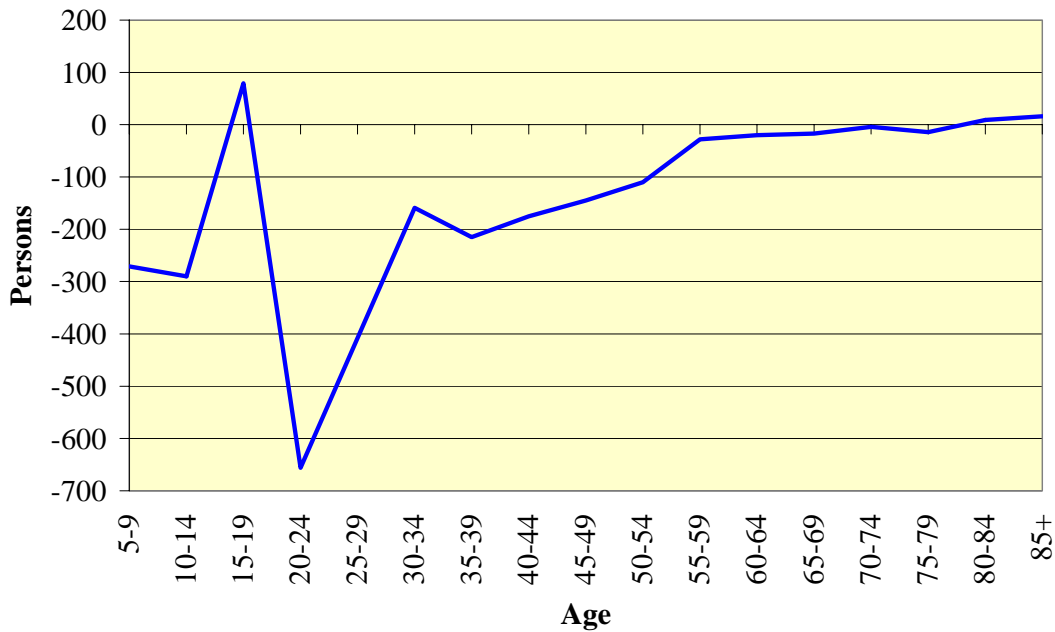


Figure 7 - Age distribution of net internal migration to Wagga Wagga from other areas, 1991-96

Conclusions, applications and further research

Both Dubbo and Wagga Wagga had significant net migration gains from their hinterland catchment. These were offset by losses to other parts of New South Wales and to other States. There were only small net losses to Sydney. To this extent they do perform the "sponge city" role, as much of the growth of these centres is due to migration from the hinterland.

However only a small proportion of net migration loss from the hinterland areas is attracted to the regional centres. Issues of population loss from rural areas are not just an issue of movement to regional centres.

Of particular interest is that the same age group (age 20 to 24) which is most attracted to the regional centres from the catchments is also the most likely to leave these centres. This suggests that the range of opportunities (education, employment and social) in the origin area relative to the destination is an important consideration in migration decisions of young people. Thus while people in outlying areas perceive a wide range of opportunities in Dubbo or Wagga Wagga, young people living there are seeking a wider range of opportunities elsewhere.

The same conclusions are apparent from the studies of Dubbo and Wagga Wagga, despite their different size, industry structure and higher education opportunities. This suggests that the conclusions may be able to be generalised to a range of regional centres in New South Wales and elsewhere. There is a need for further research incorporating other centres to confirm this.

Incorporation of other centres will require resolution of a number of technical issues, including treatment of overlapping catchments and a method of standardising for population size of the "receiving centre".

One possible application of a statewide analysis of regional centre migration is in the review of statistical area boundaries to conform with communities of interest.

Further assessment of the policy implications of these findings will require analysis of migration data for males and females separately to address issues of the lack of female employment in rural and regional centres. Consideration of the labour force status and attendance at an educational institution of movers and non-movers would also be valuable to assess the relative importance of employment and education in migration decisions of young people.

However this study has shown that migration patterns in inland areas are complex, and are not just a simple matter of the "sponge cities" soaking up the population growth in their regions.

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