

# SPACE, PLACE, POPULATION AND CENSUS ANALYSIS IN AUSTRALIA

by

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## INTRODUCTION

Space is important in our search for understanding of Australian economy and society. It has long been recognised that *where* people live and work can be a relevant factor in helping to explain their behaviour. However, unlike in many of the other independent variables we employ regularly to explain variations in attitudes, characteristics, behaviour and needs of people – ethnicity, socioeconomic status, class, role and status of women, economic wellbeing, labour force engagement etc. – our efforts to categorise location in censuses remain surprisingly crude. The typologies used by researchers and planners to differentiate settlements for analysis are commonly based on simple urban/rural dichotomies or regional units defined on an administrative basis – local government areas, statistical local areas and postcode areas. Measures of urban and rural were developed 40 years ago (Linge 1965, 1966; Hugo, *et al.* 1997) and have received only minor modification since then, especially in the conceptual sense. Indeed, the establishment of rural-urban dichotomous definitions were strongly criticised at the time of their adoption as being overly simplistic (UN 1967). However, a critical approach to the use of simple urban/rural dichotomies in censuses and surveys and to the criteria adopted to draw the distinction between them has faded with the years so that the classification systems are now largely accepted without question. It is ironic that this has coincided with a time when developments in the settlement system have made these classifications less meaningful and changes in user needs have rendered them less relevant for studying patterns of demographic development.

It is the argument of this paper that, firstly, the type of settlements that people live in is a relevant social, economic and demographic variable; secondly, that settlement systems have increased in complexity since the 1960s in both less developed and more developed contexts; thirdly, that the existing urban/rural dichotomies

employed in most census analyses to represent differences in the types of places people live in are blunt instruments for examining the role of settlement in social, economic and demographic processes; and fundamentally, that the time has come for a rethink of how settlement should be differentiated in population data collection and analysis. It is further suggested that innovations in the Australian census together with contemporary technology and methodology make it possible to analyse spatially referenced data in ways which are more sophisticated and rapid than could have been dreamt of even a decade ago.

A second part of the paper discusses the issue of the relationship between population and place in the census. It is argued that while for the most part the census relates people to one particular location in Australia, increased levels of personal mobility have meant that the connection between population and place is not a fixed one. Populations have always been able to live, work and interact with a range of places (Hägerstrand 1957) but never more so than with the increases in personal mobility of the contemporary world. Yet our population censuses and other data collections attach people to a single place – usually the place where they have their fixed place of residence. We need to ask whether it is possible to adopt practices which allow a range of population geographies to be defined in censuses and other data collections.

### **DEFINING APPROPRIATE SPATIAL UNITS FOR ANALYSIS**

In both academic and policy related research it is important to use appropriate spatial units which are meaningful in terms of the particular issue under investigation. Traditionally we have employed administrative units as the basic spatial units for research planning in Australia. This in many ways is appropriate given that local and

regional governments are important providers of services for communities and the administrative areas sometimes delineate meaningful social, economic or environmental regions in the Australian context. However, there has long been a questioning of the meaningfulness of administrative boundaries for many areas of social, economic and environmental planning and the possibility raised that there may be spatial units which are more relevant, and which facilitate the research and planning processes. There has for example been discussion centred around the idea of 'social catchments' which can be defined as ...

'The territory occupied by a group of households and individuals who are in some form of regular interaction and which the inhabitants identify as 'their' community or region'.

Social areas may be more relevant to research or planning than are administrative areas because ...

- Elements such as location, regional identity and feelings of common purpose and community can be potent forces in people's consciousness in non-metropolitan areas (Smailes 2000).
- Social catchment areas represent 'communities of interest' which open up the possibility of mobilising group action and group involvement in activities. There has been a growing recognition that social capital is one of the most important assets of communities and the concept of social catchments must be strongly linked to discussion of social capital in regional contexts.
- From the perspective of government or private sector planners, there may be efficiencies to be gained from locating outlets for providing goods and services in the central places associated with social catchments. This derives from the fact that people living within the social catchments will travel regularly to the central

place of that catchment. Hence services wishing to serve the entire catchment can be located in the central place and effectively serve the whole area.

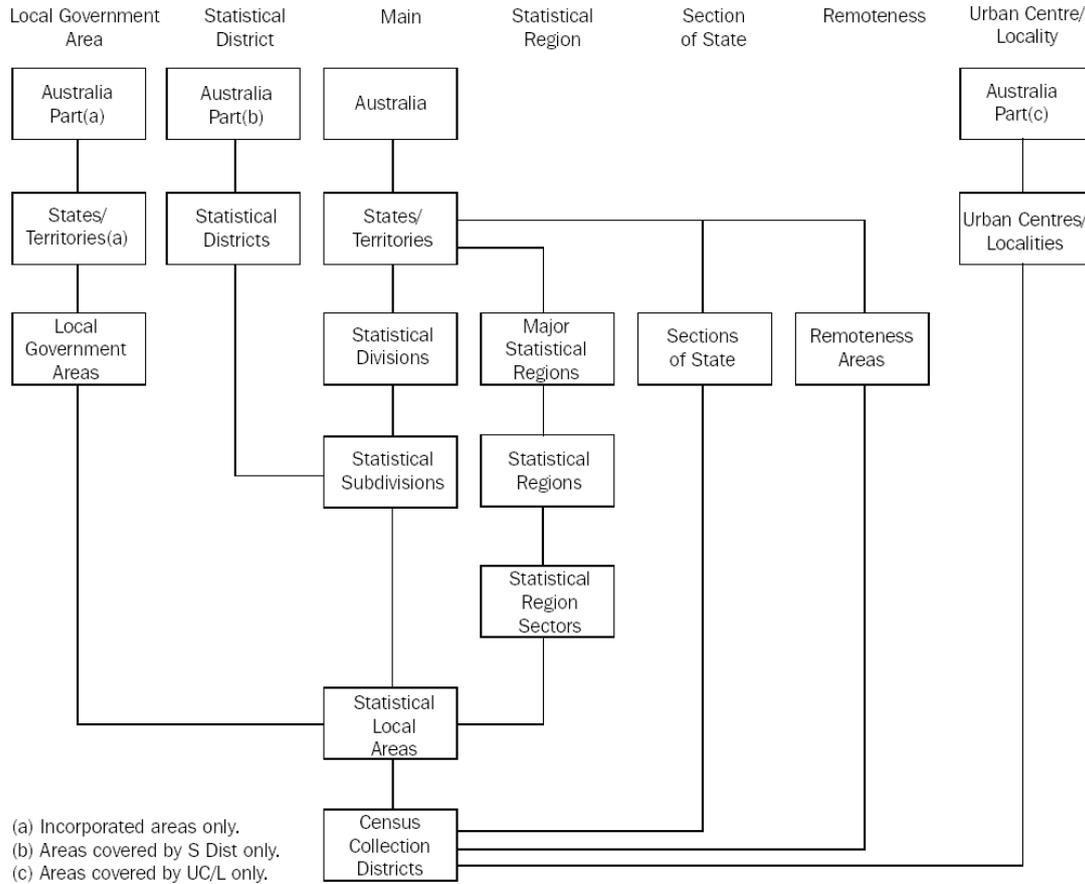
- One important issue relates to the fact that social catchments may often be a more meaningful unit for social and economic planning than conventional administrative divisions. If planning involves community mobilisation it will be possible to do this more readily within an existing cohesive community.

Similar arguments can be put up for using economic regions or environmentally defined regions.

## **AUSTRALIAN CENSUS GEOGRAPHY**

The Australian Standard Geographical Classification (ASGC) is the geographical classification designed by the Australian Bureau of Statistics (ABS) to be the national standard for the spatial units to be used in the collection, processing and dissemination of census and other statistical data. It is used not only by the ABS but also by a number of other organisations. The ASGC is a hierarchical classification which currently comprised six parallel structures until 2001 when a seventh new structure which concerns areas classified according to their degree of remoteness/accessibility was added. The structure of the current ASGC is shown in Figure 1. An important aspect of the structure is that the basic building block in the system has been the Census Collection District (CCD). All other units in the system are made of aggregations of CCDs. A CCD is an area which was originally developed as a data collection tool – it constituted the area which a single census collector could cover. It has an average of around 220 households in urban areas and less in rural areas. In the past the design of CCDs was such that it facilitated a collector getting around the district. This did not

**Figure 1: ASGC Structural Chart**  
Source: ABS 2005



always fit with relevant social or environmental boundaries. In recent years, however, efforts have been made to make the boundaries of CCDs more closely aligned with social, economic and environmental regions. At present the CCDs which create the most problems to analysts are those which are located in non-metropolitan areas, especially those of low population density in the more remote locations (Hugo *et al.* 1997). This is because in those areas the CCDs are largest in area and often contain considerable variations in population density. Often the population in the CCD tends to be clustered in one or more areas within the CCD. This makes it difficult to split the CCD population when the boundary of areas being employed in an analysis cuts across CCD boundaries.

In rural areas the use of roads as CD boundaries can lead to difficulties in defining small communities. If a community of less than 40 non-farm dwellings sits astride a road or around the intersection of two major roads then it is quite possible that that community will be split across two or more CDs and its population will be indistinguishable from that of the rest of the CD. While this is undesirable it may be unavoidable either due to lack of alternative physical features to adopt as boundaries or lack of information about the existence of such small communities at the time of CD design.

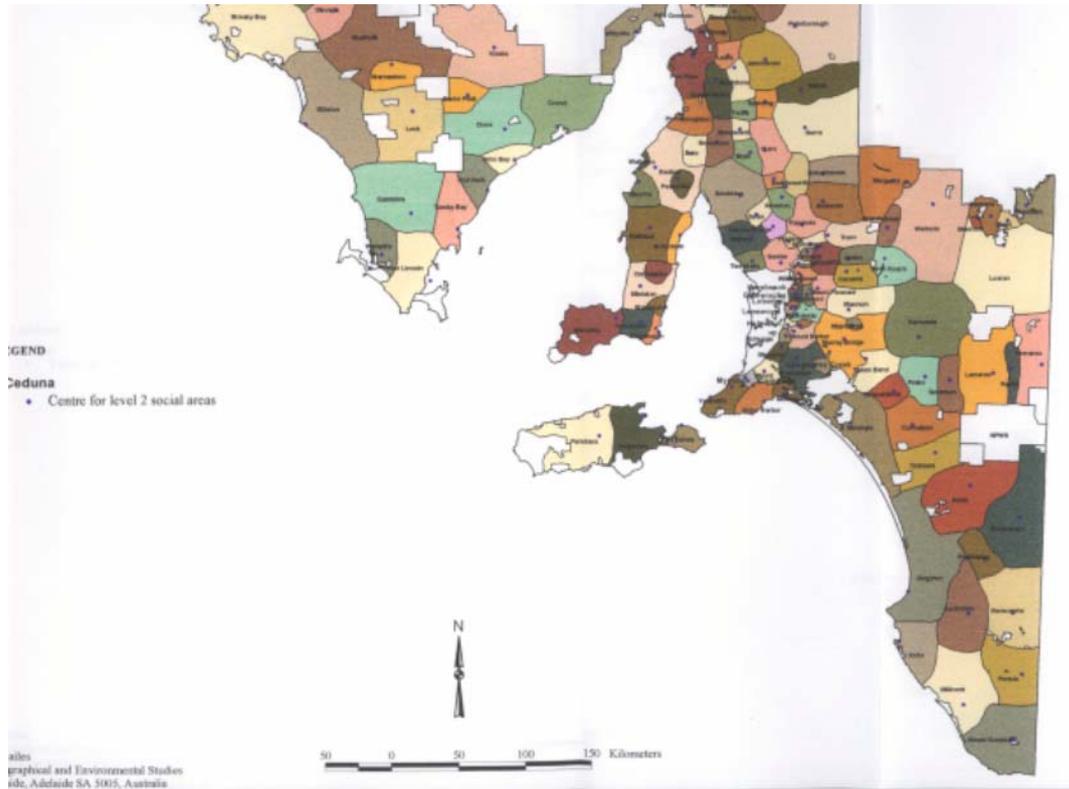
An important feature of the CCDs is the fact that one of the units most used in dissemination of statistics (the SLA or statistical local area) is derived predominantly from administrative areas – local government areas (LGAs). Although this correspondence is getting less and less as there is amalgamation of LGAs, it could be argued that while it is important to retain such administrative-based areas in the ASGC those areas often do not constitute meaningful social, economic or environmental regions and hence may not be appropriate for much planning. As Fenton, Coakes and Marshall (2000, 6) have pointed out:

‘Definitions of community should be meaningful in relation to prevailing social structures, levels of community organisation and interdependence and not to be defined purely on the basis of convenient administrative boundaries or data availability’.

In this context it is interesting to compare some non-metropolitan social catchments derived by intensive interviews of respondents with official SLA boundaries. Below we make such a comparison for non-metropolitan South Australia. Figure 2 and Figure 3 depict two levels of social areas derived by Smailes (1999) using

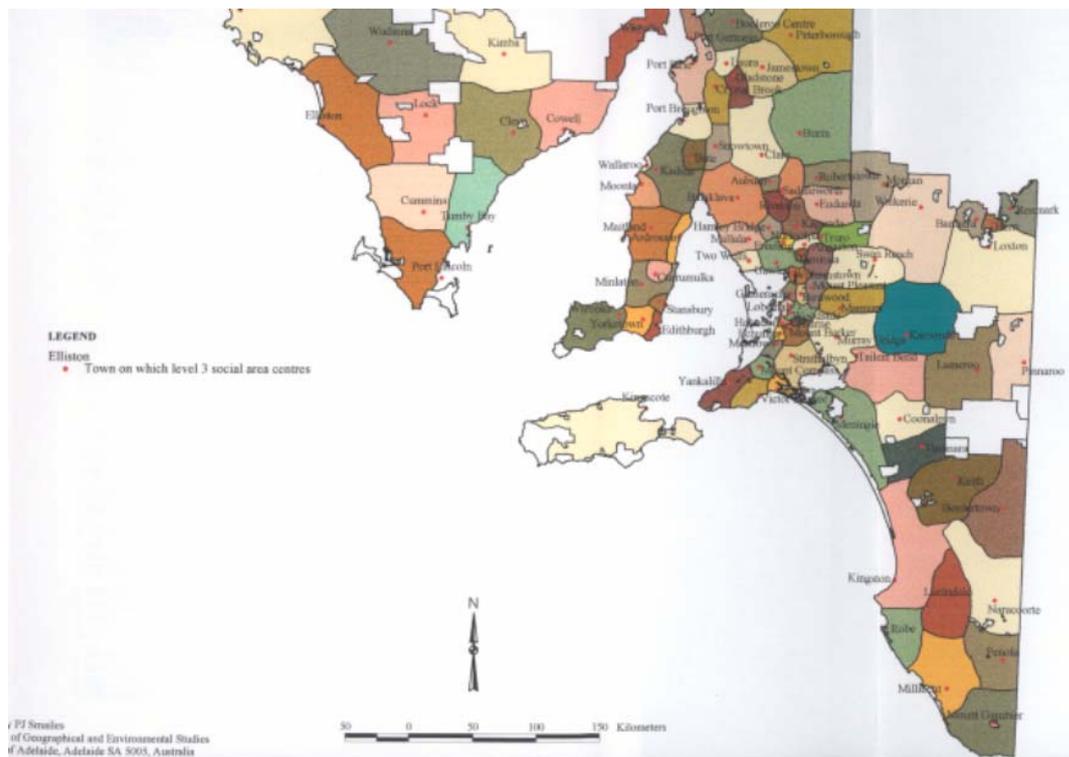
**Figure 2: Level 2 Social Areas: South Australia**

Source: Smailes 1999



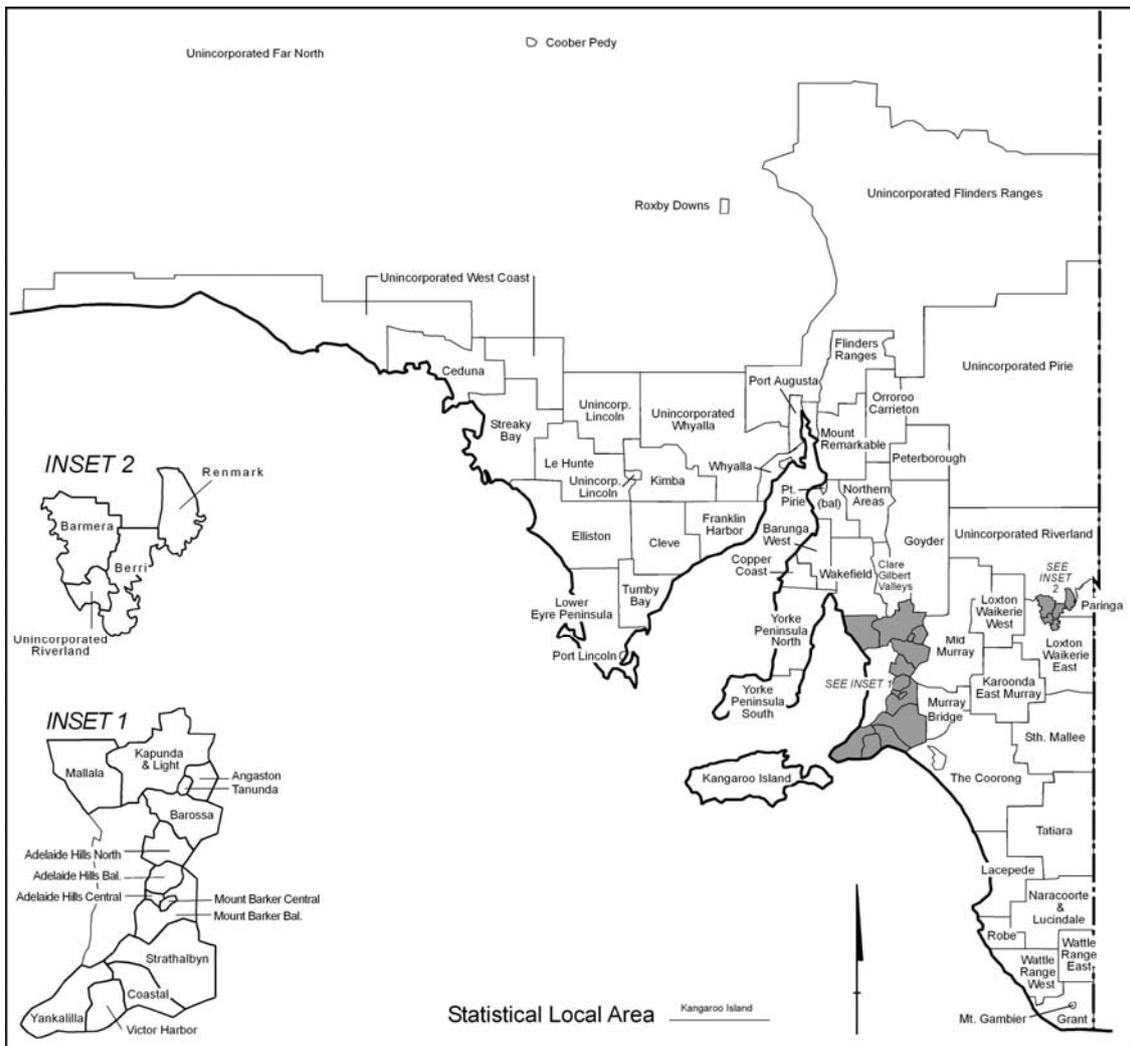
**Figure 3: Level 3 Social Areas: South Australia**

Source: Smailes 1999



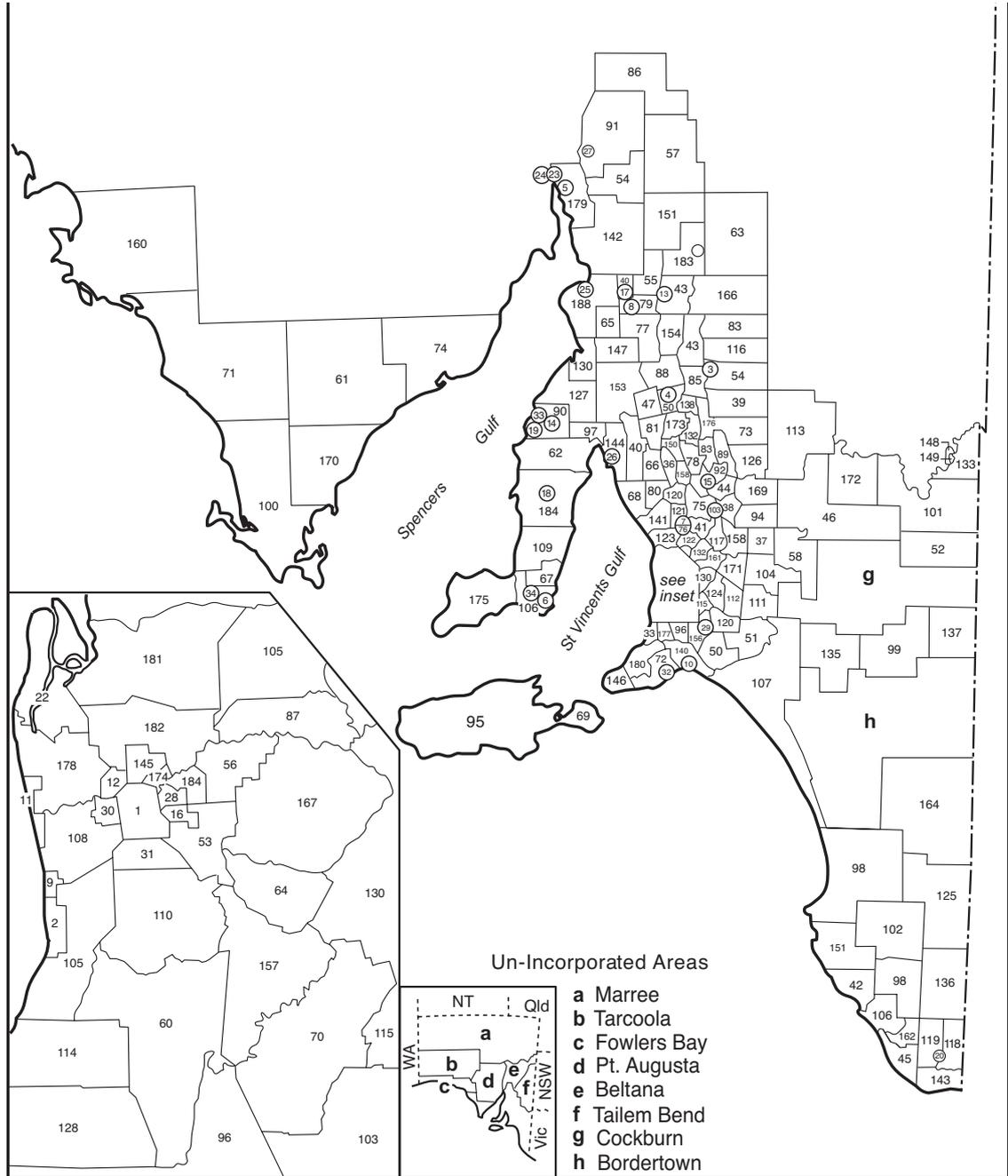
intensive interviewing of respondents living outside urban centres and localities with 200 inhabitants or more. The sample of respondents were drawn from the electoral roll of the State. It is apparent when we compare these maps to the current boundaries of SLAs in non-metropolitan South Australia (Figure 4) that although there is some correspondence the fit is by no means perfect. It is interesting if we look at the boundaries of LGAs in non-metropolitan South Australia in the early twentieth century. At this time the local government units in non-metropolitan areas were much smaller

**Figure 4: South Australia – Statistical Local Areas Outside Adelaide, 2001**



and in fact were more closely aligned to social areas than is currently the case. This is apparent in Figure 5 which shows the boundaries of LGAs in South Australia in 1921.

**Figure 5: South Australia: Local Government Areas, 1921**



(Figure 5 continued)

(Figure 5 continued)

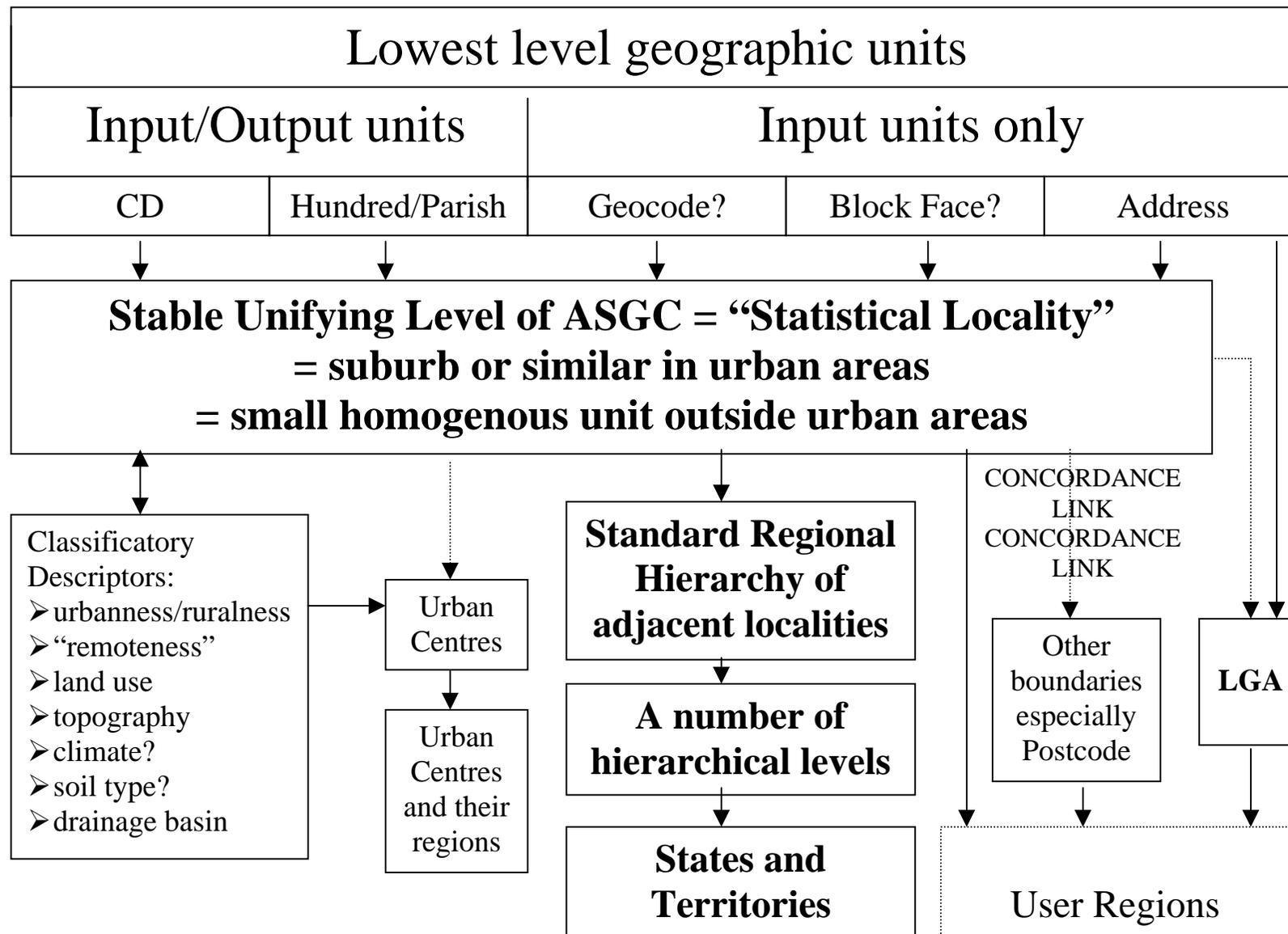
- |                                     |                          |  |
|-------------------------------------|--------------------------|--|
| 1. ADELAIDE                         | 62. CLINTON              | 125. NARACOORTE                        |
| 2. BRIGHTON                         | 63. COGLIN               | 126. NEALES                            |
| 3. BURRA                            | 64. CRAFTERS             | 127. NINNES                            |
| 4. CLARE                            | 65. CRYSTAL BROOK        | 128. NOARLUNGA                         |
| 5. DAVENPORT                        | 66. DALKEY               | 129. ONAUNGA                           |
| 6. EDITHBURGH                       | 67. DALRYMPLE            | 130. ONKAPARINGA                       |
| 7. GAWLER                           | 68. DUBLIN               | 131. ORROROO                           |
| 8. GLADSTONE                        | 69. DUDLEY               | 132. PARA WIRRA                        |
| 9. GLENELG                          | 70. ECHUNGA              | 133. PARINGA                           |
| 10. GOOLWA                          | 71. ELLISTON             | 134. PAYNEHAM                          |
| 11. HENLEY AND GRANGE               | 72. ENCOUNTER BAY        | 135. PEAKE                             |
| 12. HINDMARSH                       | 73. ENGLISH              | 136. PENOLA                            |
| 13. JAMESTOWN                       | 74. FRANKLIN HARBOR      | 137. PINNAROO                          |
| 14. KADINA                          | 75. FREELING             | 138. PIRIE                             |
| 15. KAPUNDA                         | 76. GAWLER SOUTH         | 139. PORT BROUGHTON                    |
| 16. KENSINGTON AND<br>NORWOOD       | 77. GEORGETOWN           | 140. PORT ELLIOT                       |
| 17. LAURA                           | 78. GILBERT              | 141. PORT GAWLER                       |
| 18. MAITLAND                        | 79. GLADSTONE            | 142. PORT GERMEIN                      |
| 19. MOONTA                          | 80. GRACE                | 143. PORT MACDONNELL                   |
| 20. MOUNT GAMBIER                   | 81. HALL                 | 144. PORT WAKEFIELD                    |
| 21. PETERBOROUGH                    | 82. HALLETT              | 145. PROSPECT                          |
| 22. PORT ADELAIDE                   | 83. HAMILTON             | 146. RAPID BAY                         |
| 23. PORT AUGUSTA                    | 84. HAMMOND              | 147. REDHILL                           |
| 24. PORT AUGUSTA WEST               | 85. HANSON               | 148. RENMARK IRRIGATION<br>TRUST NO. 1 |
| 25. PORT PIRIE                      | 86. HAWKER               | 149. RENMARK TOWN                      |
| 26. PORT WAKEFIELD                  | 87. HIGHERCOTBE          | 150. RHYNIE                            |
| 27. QUORN                           | 88. HUTT AND HILL RIVERS | 151. ROBE                              |
| 28. ST. PETERS                      | 89. JULIA                | 152. SADDLEWORTH                       |
| 29. STRATHALBYN                     | 90. KADINA               | 153. SNOWTOWN                          |
| 30. THEBARTON                       | 91. KANYAKA              | 154. SPALDING                          |
| 31. UNLEY                           | 92. KAPUNDA              | 155. SPRINGTON                         |
| 32. VICTOR HARBOR                   | 93. KENNION              | 156. STANLEY                           |
| 33. WALLAROO                        | 94. KEYNETON             | 157. STIRLING                          |
| 34. YORKETOWN                       | 95. KINGSCOTE            | 158. STOCKPORT                         |
| 35. ALDINGA                         | 96. KONDOPARINGA         | 159. STRATHALBYN                       |
| 36. ALMA PLAINS                     | 97. KULPARA              | 160. STREAKBY BAY                      |
| 37. ANGAS                           | 98. LACEPEDE             | 161. TALUNGA                           |
| 38. ANGASTON                        | 99. LAMEROO              | 162. TANTANOOLA                        |
| 39. APOINGA                         | 100. LINCOLN             | 163. TANUNDA                           |
| 40. BALAKLAVA                       | 101. LOXTON              | 164. TATIARA                           |
| 41. BAROSSA                         | 102. LUCINDALE           | 165. TEA TREE GULLY                    |
| 42. BEACHPORT                       | 103. MACCLESFIELD        | 166. TEROWIE                           |
| 43. BELALIE                         | 104. MANNUM              | 167. TORRENS EAST                      |
| 44. BELVIDERE                       | 105. MARION              | 168. TORRENS WEST                      |
| 45. BENARA                          | 106. MELVILLE            | 169. TRURO                             |
| 46. BLANCHETOWN (NOW<br>SWAN REACH) | 107. MENINGIE            | 170. TUMBY BAY                         |
| 47. BLYTH                           | 108. MILLICENT           | 171. TUNGKILLO                         |
| 48. BOOBOROWIE                      | 109. MINLATON            | 172. WAIKERIE                          |
| 49. BOYOOLIE                        | 110. MITCHAM             | 173. WAKEFIELD, UPPER                  |
| 50. BREMER                          | 111. MOBILONG            | 174. WALKERVILLE                       |
| 51. BRINKLEY                        | 112. MONARTO             | 175. WAROOKA                           |
| 52. BROWN'S WELL                    | 113. MORGAN              | 176. WATERLOO                          |
| 53. BURNSIDE                        | 114. MORPETT VALE        | 177. WILLUNGA                          |
| 54. BURRA                           | 115. MOUNT BARKER        | 178. WOODVILLE                         |
| 55. CALTOWIE                        | 116. MOUNT BRYAN         | 179. WOOLUNDUNGA                       |
| 56. CAMPBELLTOWN                    | 117. MOUNT CRAWFORD      | 180. YANKALILLA                        |
| 57. CARRIETON                       | 118. MOUNT GAMBIER EAST  | 181. YATALA NORTH                      |
| 58. CAURNAMONT                      | 119. MOUNT GAMBIER WEST  | 182. YATALA SOUTH                      |
| 59. CLARE                           | 120. MUDLA WIRRA NORTH   | 183. YONGALA                           |
| 60. CLARENDON                       | 121. MUDLA WIRRA SOUTH   | 184. YORKE PENINSULA                   |
| 61. CLEVE                           | 122. MUNNO PARA EAST     |  |
|                                     | 123. MUNNO PARA WEST     |  |
|                                     | 124. NAIRNE              |  |

Urban centres and localities are groups of CDs which represent population clusters. Urban centres of greater than 20,000 people are contiguous clusters of CDs with population density greater than 200 persons per square kilometre. For smaller urban centres of 1,000 to 19,999 persons more subjective criteria are used to bound the urban area. Localities are population clusters of 40 or more non-farm dwellings and a minimum population of 200 persons. There were 1,709 urban centres and localities defined in the 2001 Population Census. Urban centres and localities are only defined in the census year.

Some years ago the ABS conducted a review of the ASGC (ABS 1996 and 1997). While few of the recommendations of that review were taken up immediately, some have been subsequently introduced. Figure 6 presents a suggested conceptual framework for a revised ASGC which was developed during the review. An interesting aspect of this was the 'statistical locality' element in the classification.

This was a unit largely intended to replace the SLA although it was maintained that should remain in the system since local government is obviously an important element of governance and planning. The new statistical locality in non-metropolitan areas was to be defined so as to include 'homogeneous' units – presumably including entire communities. A concordance was to be developed to allow intercensal comparisons using SLAs to be made. There has been a move toward this concept in the ABS with the increasing use of suburbs in metropolitan areas but the recommendation for statistical localities in non-metropolitan areas has not been followed up.

**Figure 6: Overview of Possible Conceptual Framework for a Revised ASGC**  
 Source: ABS 1997

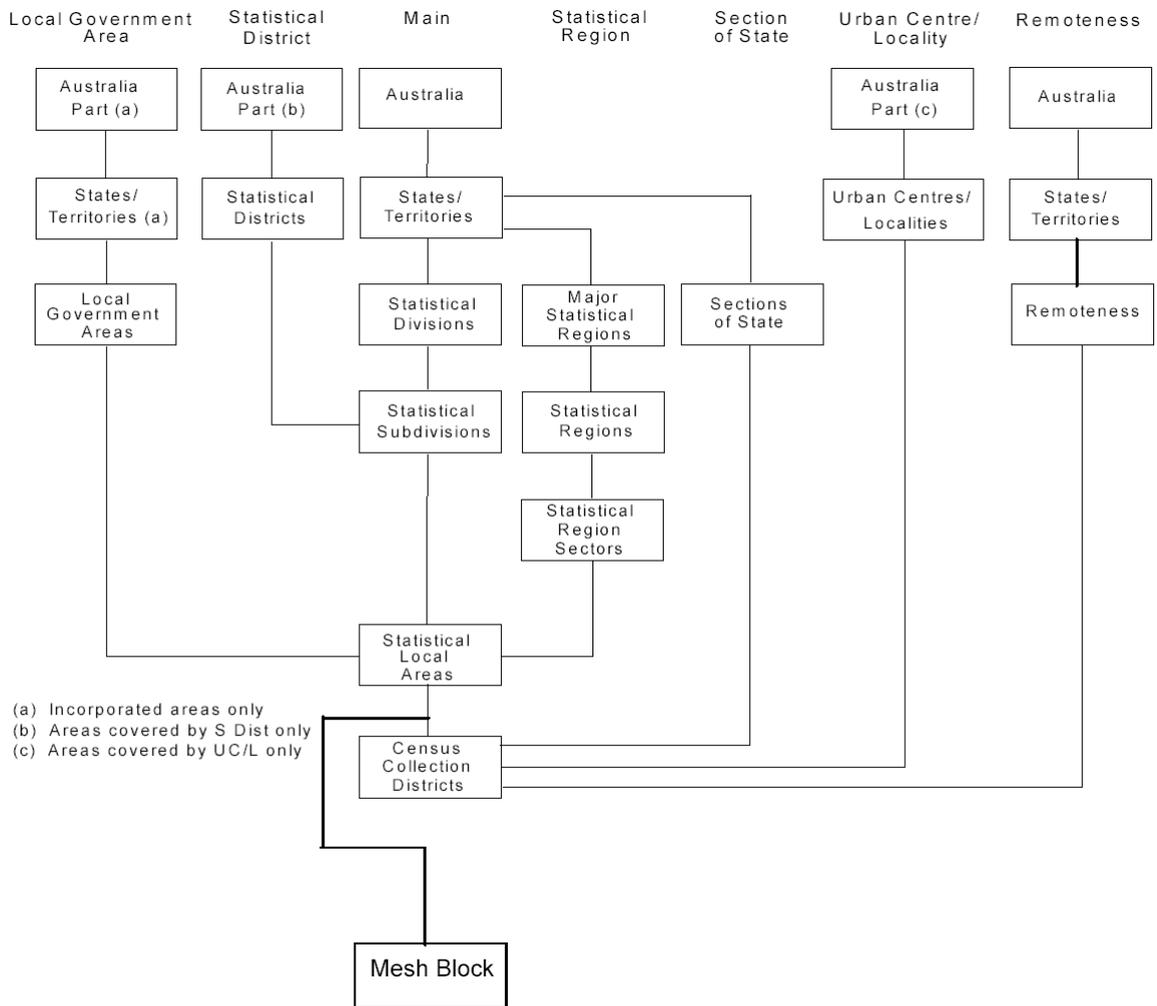


The most dramatic change in Australian census geography has been the development of meshblocks as the replacement basic unit of the ASGC of CDs. These units contain a minimum of 30 dwellings equating to 60 people and hence substantially smaller than CDs (200 dwellings). They have the following characteristics ...

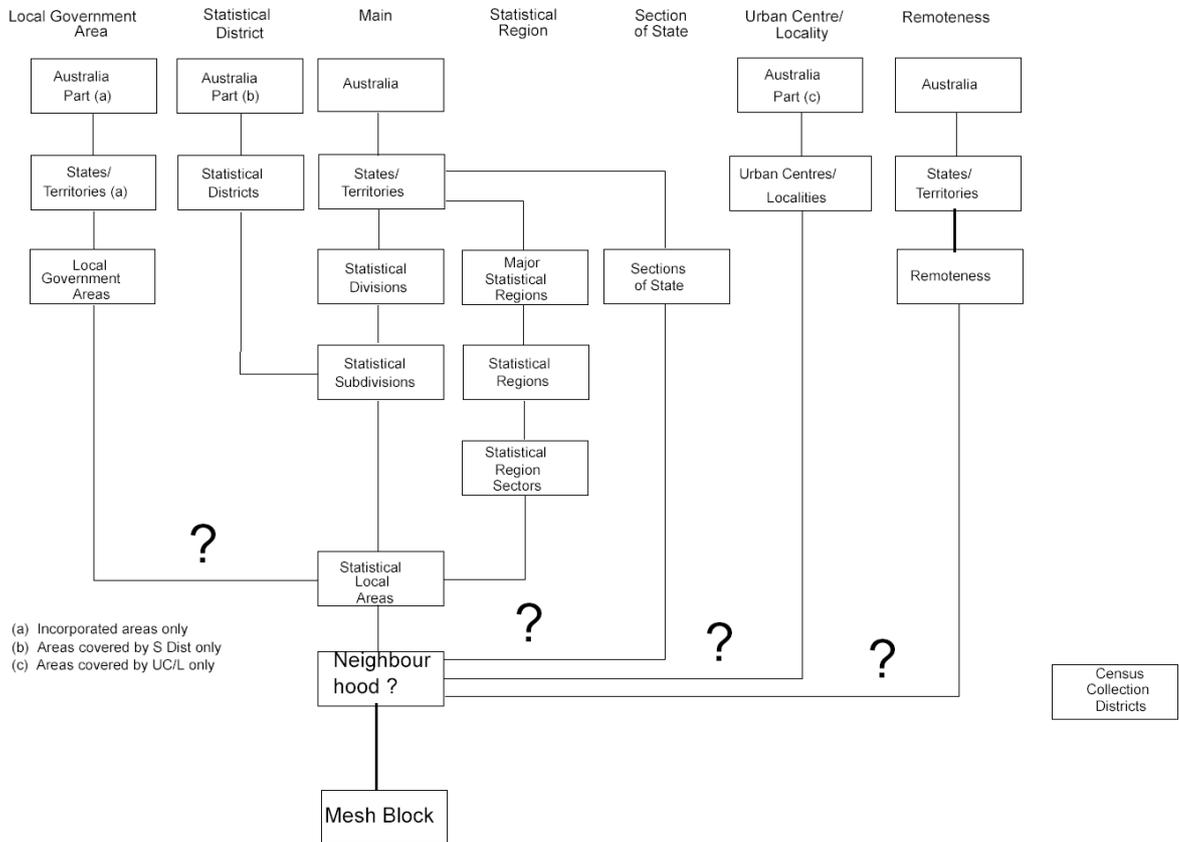
- align with officially gazetted locality boundaries (SLAs);
- are not constrained by boundaries which change over time;
- constructed from road centrelines, railways, rivers, suburb boundaries and water;
- classified as either urban or rural and as: water, parkland, residential, industrial, commercial, educational, hospital/medial, agricultural and other

The defining of these units has been made possible by the creation of GNAF (Geocoded National Address File) and advances in GIS. Hence, the basic building blocks to aggregate units to form meaningful social, economic and environmental regions for analysing census data are much smaller. There is now a much greater degree of flexibility in census geography and the ASGC takes on a new form (Figure 7). While there have been some concerns about particular boundaries, this represents a new degree of flexibility in the spatial analysis of census data. It is planned that at the 2011 census there may be some intermediate sized “neighbourhood” units introduced to be between the CD and SLA in size. The CD is likely to be phased out (Figure 8).

**Figure 7: The ASGC 2006**  
 Source: Blanchfield 2004



**Figure 8: The ASGC 2011**  
**Source: Blanchfield 2004**



## SETTLEMENT TYPE

For some purposes the spatial breakdown required may not be of regions of particular types but seek to categorise areas (and the population in them) according to the *type of settlement*. In this respect the simple urban/rural dichotomy has become a fundamental part of census systems across the world. Virtually all countries differentiate demographic data on the basis of urban or rural residence (Shryock, Siegel *et al.* 1971). The most recently published edition of the UN's *World Urbanization Prospects* (UN 2005) presents data on urban and rural populations for 228 countries and areas. This is justified on the grounds that where people live is a powerful discriminator of behaviour. Certainly, clear urban-rural contrasts

were found in some of the earliest analyses carried out by the UN. One example, taken from UN (1952), shows that the ratio of children under 5 years of age to women in the childbearing ages was higher in rural than in urban areas.

These contrasts are assumed to be related to a range of stereotypical differences identified between urban and rural populations, such as those shown in Table 1. Besides the lower levels of fertility and mortality shown there for urban areas, the latter are the parts of

**Table 1: Some Widely Accepted Traditional Stereotypical Differences Drawn Between Urban and Rural Populations**

Source: Hugo 1987

Dimension	Urban	Rural
1. Economy	Dominated by secondary and tertiary activities	Predominantly primary industry and activities supporting it
2. Occupational Structure	Manufacturing, construction, administration and service activities	Agriculture and other primary industry occupations
3. Education Levels and Provision	Higher than national averages	Lower than national averages
4. Accessibility to Services	High	Low
5. Accessibility to Information	High	Low
6. Demography	Low fertility and mortality	High fertility and mortality
7. Politics	Greater representation of liberal and radical elements	Conservative, resistance to change
8. Ethnicity	Varied	More homogeneous
9. Migration Levels	High and generally net in-migration	Low and generally net out-migration

the nation where agricultural and other primary occupations are less important, where education levels and provision are higher than average and where accessibility to services and information is also high. Meanwhile, rural areas tend to be more homogeneous in their ethnic composition, more conservative in their political outlook and generally more resistant to change.

However there are at least three arguments why the rural-urban dichotomy is less meaningful and relevant in contemporary Australia. One is that the distinction between rural and urban areas, which has rarely been clear cut, is becoming increasingly blurred. A second line of argument is that, with a growing variety of users and applications, reliance on a

unidimensional classification of settlements is becoming more questionable. Thirdly, the last two or three decades have seen the emergence of new types of urbanization and urban change, with implications for the settlement system that cannot be captured through traditional notions of the urban and the rural (Hugo, Champion and Lattes 2003).

The weight of opinion, however, is that there is still a meaningful distinction to be made between urban and rural populations and areas, even in MDCs. Despite the emergence of a predominantly urban society and the modernisation of rural areas, there may still be enough important differences between the two to justify the continued use of this dimension in classifying settlement (Willits *et al.* 1982; Lang 1986). Most would argue, however, that a dichotomy is too simplistic and indeed the arguments in favour of replacing the dichotomy with a continuum go back many years (e.g. Pahl 1966). In the words of Lang (1986, 120), rural and urban:

“..... denote opposite ends of the conceptual continuum with real people and communities falling somewhere between the two hypothetical extremes. Any specific instance in the real world, therefore, can be viewed as demonstrating relative degrees of rurality and its opposite, urbanity, falling somewhere along the continuum between the two extremes.”

This recognition that there is rarely a sharp demarcation between urban and rural areas has led to the identification of gradients of ‘urbanness’ and ‘ruralness’. In many cases, however, these gradients are merely used as the means for separating out the urban areas.

Over the years the number of examples of settlement classifications going beyond the simple urban/rural dichotomy has grown, with many of these going well beyond a three-fold division. These usually involve categorizing spatial units other than localities but rather regions, areas or other parts of countries. Particularly innovative in its time, not least because it approached its task from the rural end of the spectrum, is the approach of Cloke (1977). His ‘index of rurality’ for England and Wales recognized four degrees of rurality for those parts of

the country which lay outside the main built-up urban areas: extreme rural, intermediate rural, intermediate non-rural and extreme non-rural. Similarly, for the USA, Cromartie and Swanson (1996) created a four-level classification of areas beyond the 'metro core'. As shown in Table 2, this was based on population size, population density, levels of urbanisation, commuting patterns and adjacency.

**Table 2: United States Rural-Urban Settlement Continuum According to Cromartie and Swanson**

Source: Cromartie and Swanson 1996, 5-6

1. Metro Core	Begins with an 'urbanised area' i.e. extent and distribution of the built-up area. If 50 percent of the spatial unit's population is contained in the urbanised area it is indicated as part of the metro core.
2. Metro Outlying	Areas linked to core by commuting and exhibiting metropolitan character (as measured by population density, percent urban and recent population growth).
3. Non-Metro Adjacent	Physically adjacent to a metropolitan area with at least 2 percent of employed labour force commuting to urban core.
4. Non-Metro Non-Adjacent with City	Areas not adjacent to Metro Areas but contain all or part of a city of 10,000 or more residents.
5. Non-Metro Non-Adjacent without City	Access not adjacent to Metro Areas and without a city of 10,000 or more inhabitants.

A similar process of synthesis has been adopted in Brazil. Cunha and Rodrigues (2001) report on a major innovation in its 1991 Census and 1996 Population Count, involving a new more complex classification of settlement types. Instead of a simple urban-rural categorization, Table 3 shows the results of dividing Sao Paulo State into eight 'place of residence' categories. These have then been collapsed into three groups that include a transitional type between urban and rural areas. This may be a model for making standard recommendations for other nations and needs closer investigation.

**Table 3: Reclassification of ‘Place of Residence’ for the Population of São Paulo State, with respect to the definition of ‘Transition Areas’**

Source: Cunha and Rodrigues 2001, 24

Area Reclassification	Place of Residence (1991/1996)
‘Urban’ (1 and 2)	1) Urbanised area
	2) Non-urbanised area
Transition (3 and 4), where:	
Urban Transition/UR-TR (3)	3) Isolated urban area
Rural Transition/RU-TR (4)	4) Rural agglomerate of urban extension
‘Rural’ (5, 6, 7, and 8)	5) Isolated rural agglomerate or village
	6) Isolated rural agglomerate or nucleus
	7) Other population agglomerates
	8) Rural area (excluding rural agglomerate)

Note: The terms ‘urban’ and ‘rural’ are presented between quotation marks when not including the population of the transition area.

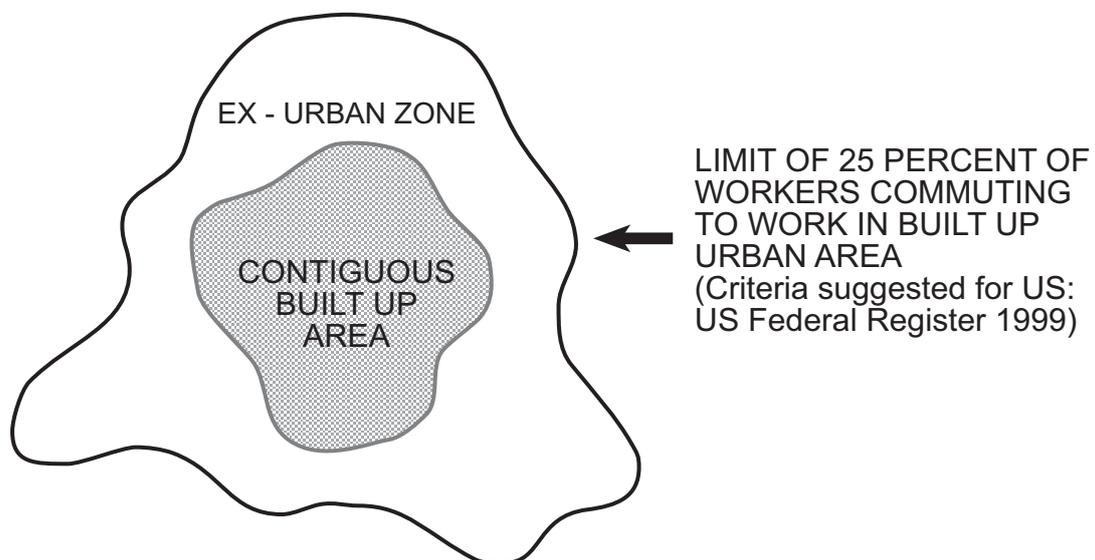
One of the main reasons for the increasingly blurred nature of the urban-rural distinction is the emergence of new forms of urbanization. Traditionally this has been associated with the suburbanization process, which comprised urban development that did not involve a full range of urban functions, being mainly residential in nature. This became more problematic for defining settlements when increases in personal mobility permitted housebuilding to occur well beyond the boundary of the main built-up area of settlements, especially when this occurred in the sporadic, apparently haphazard pattern denoted by the term ‘urban sprawl’. Recent decades, however, have seen this type of process take on new dimensions, notably with the decentralization of non-residential functions. Over time, the latter has taken a range of different forms, including commercial strips along radial routes and large manufacturing, warehousing and retail parks close to intercity highway junctions. More recently, particular attention has been focused on the so-called ‘edge city’ developments that have succeeded in

attracting high-level business and other CBD activities away from the cores of urban areas (Garreau 1991).

The most common reaction to this challenge has been to recognise a distinctive zone around cities that is transitional in nature. This is similar to the idea of an intermediate category of settlement, as discussed above, except that in this case we are dealing with the treatment of land arranged 'horizontally' around an urban centre rather than classifying settlements ranked 'vertically' by size or some other criterion of 'urbanness'. Such 'fringe' areas normally aspire to a more rural appearance, but contain many functions that are strongly associated with the nearby urban area. Moreover, their residents tend to maintain strong regular (often daily) contacts with the main urban centre, leading commentators to suggest that these areas are best considered to be part of a wider 'metropolitan region' or 'urban field' focused on the 'city proper' (Spectorsky 1958; Friedmann and Miller 1965; Pahl 1965). This transitional zone has been given a variety of labels such as Ex-Urban (Davis 1990, McKenzie 1996), Peri-Metropolitan (Burnley and Murphy 1995), Technoburb (Fishman 1990) and Exurbia (Nelson and Dueker 1990). Burnley and Murphy (1995: 245) have described these areas as comprising urban centres set in a matrix of rural land where the traditional agricultural and associated service functions have been invaded by uses associated with the nearby metropolitan area, including the development of low density residential areas for metropolitan workers and retirees. In the United States this has been recognised as a new settlement form housing some 60 million people or a quarter of the total population (Nelson and Dueker 1990). The term 'rural-residential' has been used to describe new developments of housing of various densities for people predominantly commuting to the metropolitan area (but not necessarily the CBD or inner city) with some having hobby farms and others residential allotments only. Clearly, this is widely seen as a distinctive landscape, not least because it is associated with particular land-use and planning issues arising from clashes of urban and rural functions and values.

The most popular way of coping with this phenomenon in demographic analysis and reporting is through the concept of functionally-defined areas. Rather than relying on definitions based on the physical form of urban development, this approach uses interaction criteria to delimit the whole territory that is strongly linked to the urban centre. A schematic representation is depicted in Figure 9. This approach was pioneered in the USA in the late 1940s, when the concept of 'metropolitan area' was introduced into census thinking. It has subsequently been adopted widely in academic research around the world, for instance in the

**Figure 9: Schematic Representation of Suggested Functional Metropolitan Region**



UK and for Europe as a whole. These include applications where population growth differentials between the main urban core and the surrounding 'ring' have been used to monitor urban decentralization and recentralization trends (Hall and Hay 1980; Berg, *et al.* 1982; Champion, *et al.* 1987; Cheshire 1995).

In sum, the key issue is that the Australian settlement system has undergone substantial changes in recent years, posing a major challenge to those involved in conducting censuses and surveys and in presenting and analysing the data generated by them. In replacing the simple urban/rural dichotomy by an approach that includes a depiction of the changing

structure of the urban system, it is clear that new concepts are needed to handle the complexities of present-day reality.

The urban/rural distinction whether represented as a dichotomy or a continuum is unidimensional in nature. However, human settlement is multidimensional. As Coombes and Raybould (2001, 224) have argued ...

‘... in an increasingly complex pattern of settlement, linked with socio-economic polarisation, no single measure can represent all of the distinct aspects of settlement structure that will be of interest to public policy’.

They go on to suggest that there are at least three key dimensions to modern human settlement patterns that are quite distinct from each other and which are all important for policy makers to take into account when they are allocating resources or designing programmes. These are:

- settlement size – ranging from metropolitan to hamlet,
- concentration – ranging from dense to sparse, and
- accessibility – ranging from central to remote.

In their view, these three dimensions need to be recognised and measured individually: ‘It is inappropriate to try to proxy any of the three with either of the others’ (Coombes and Raybould 2001: 224).

Accessibility, for example, captures a quite different element of the settlement system than does settlement size or population density. In examining demographic, economic and social behaviour it may be that variations in people’s level of accessibility to services such as education and health is more influential than whether or not they live in an urban area. In recognizing the significance of context in influencing demographic processes we need to become more sophisticated in the way that we specify context as an explanatory variable. Where people live and work has important implications for demographic, economic, social and environmental processes. We need to include consideration of context in our analysis of causes and implications of these processes. As Mendelson (2001) has argued, standard

geographic areas are too often used only as ‘containers’ for the dissemination of statistical data: it is not recognised that these geographic structures can be used as variables to better analyse social and economic processes. Moreover, there has been a failure to recognise that settlement systems have changed dramatically in the last three decades while the concepts used to measure and operationalise them have changed little.

*Accessibility* constitutes a key dimension of the settlement system according to Coombes and Raybould (2001). Certainly, access to basic goods and services is a key factor influencing people’s quality and cost of living, and as a result can be an influential element in shaping demographic, economic and social processes. Accessibility is a complex variable incorporating not only physical elements but also socio-economic differences in access to transport, cultural and other factors. However, it is argued here that if a standard generic approach to measuring accessibility is to be considered it is preferable to measure only physical accessibility. For particular purposes, though, it may be possible (indeed desirable) to include other relevant dimensions of accessibility.

One example of portraying this dimension is the Accessibility/Remoteness Index of Australia (ARIA). This was developed by the National Centre for Social Applications of Geographical Information Systems to indicate accessibility in the non-metropolitan part of Australia (Bamford *et al.* 1999). It is based on 11,338 population localities identified on the 1:250,000 topographic map series and uses road distances measured between each of these and the nearest of four different levels of service centre. The four minimum distances for each of the 11,338 localities were then converted to ratios by dividing by the mean distance between all of the populated localities and each class of service centre. A threshold of 3.0 for each ratio was applied and the ratios summed to produce a continuous variable from 0 (*high accessibility*) to 12 (*high remoteness*). However, to facilitate interpretation, ARIA values were aggregated into five categories ranging from highly accessible to very remote. To give an indication of how this can be of importance in demographic study, Table 4, Table 5 and Table

6 shows how there is a clear relationship between a number of demographic and socio economic variables on the one hand, and accessibility on the other. The ABS has modified ARIA and now included it in the ASGC (Figure 7).

**Table 4: Australian Non-Metropolitan Areas: Population Growth by Level of Accessibility, 1991-96 and 1996-2001**

Source: Glover *et al.* 1999; ABS 2001 Census calculations

Level of Accessibility	Rate of Population Growth (%)		Population Density Persons per km <sup>2</sup>	
	1991-96	1996-2001	1996	2001
Highly accessible	6.2	6.6	77.2	80.0
Accessible	5.1	3.7	4.1	4.1
Moderately accessible	3.6	1.5	1.0	1.0
Remote	1.2	-1.0	0.2	0.2
Very remote	2.9	4.5	0.0	0.1
Total	5.8	6.0	2.3	2.5

Notes:

1. All calculations are made on the basis of SLA values aggregated to the accessibility categories.
2. The accessibility classification is based on the updated ARIA+ classification for the 2001 ASGC. Because the breakpoints between categories for the 2001 version have changed since the original ARIA, the breakpoints for the table above were adjusted to be concordant with the 1996-2001 table.
3. The population density data is based on Table B01 of the Basic Community Profile for 2001. The population change data is based on time series population estimates adjusted to the 2001 boundaries.

**Table 5: Australia: Total Fertility Rate, Infant Mortality Rate and Standardised Mortality Rates for Males and Females Aged 15-64; 1992-95**

Source: Glover, Harris and Tennant 1999: 135, 140, 144, 182

Accessibility/Remoteness Index	TFR	IMR	SMR	
			Males 15-64	Females 15-64
Very accessible	1.79	5.8	96	97
Accessible	2.15	7.1	118	102
Moderately accessible	2.30	6.3	116	106
Remote	2.43	8.0	128	126
Very remote	2.51	13.4	201	258

**Table 6: Australia: Geographic Distribution<sup>(a)</sup> People Living in Most Disadvantaged Areas<sup>(b)</sup>, 1996**

Source: ABS 2000

Section of State	Most Socioeconomically Disadvantaged People <sup>(c)</sup>					All Persons <sup>(c)</sup>				
	Highly Accessible %	Accessible %	Moderately Accessible %	Remote/ Very Remote %	Total %	Highly Accessible %	Accessible %	Moderately Accessible %	Remote/ Very Remote %	Total %
Major urban	55.2	0.5	0.0	0.0	55.7	62.1	0.6	0.0	0.0	62.7
Other urban	17.3	11.9	2.9	1.7	33.8	12.8	7.1	2.0	1.4	23.3
Rural locality	1.1	2.0	1.0	1.2	5.2	1.0	0.8	0.5	0.3	2.5
Rural balance	1.2	2.2	0.7	1.4	5.4	5.9	3.3	1.5	0.8	11.5
Total	74.7	16.5	4.6	4.3	100.0	81.8	11.8	4.0	2.5	100.0

(a) Described using two classifications of areas, see details on the preceding page.

(b) Refers to people in the 20% of CDs with the lowest scores on the Index of Relative Socio-economic Disadvantage.

(c) Excludes overseas visitors and persons in offshore, shipping and migratory CCDs.

GISCA is now proposing with PSMA<sup>1</sup> a study to develop a “seamless ARIA” where not only would there be an ARIA index available for every land parcel in the country but also individual indices associated with key services.

Such an approach would no longer require interpolation as there would be a definitive index for every address in Australia. Aggregation would be possible to any boundary and an accessibility/remoteness index could also be calculated for a range of other nominated key services for every land parcel enabling enormous flexibility in terms of analysis.

## IDENTIFYING DIFFERENT POPULATION GEOGRAPHIES

One of the most basic characteristics of censuses is that they assign people to a particular part on the earth’s surface – their usual place of residence. However the reality is that in the contemporary world of high personal mobility people spend considerable time in several places. It is possible then to relate people to a range of places – not just their place of usual residence. We need to therefore raise the question as to whether a range of population geographies can be defined in censuses.

One obvious distinction that can be drawn is between daytime and nighttime populations. These can be readily distinguished using standard census journey to work

questions yet virtually all data from censuses are only made available on the basis of nighttime populations. Similarly, with increased levels of temporary migration both internal (Bell and Brown, 2006) and international (Hugo, 2006), we need to be able to assess the *actual* populations of cities, regions and countries not only the more or less permanent residents of those spaces which have traditionally been the basis on which censuses have been conducted and analysed. Differentiating the permanent and non-permanent populations of places has been done in censuses of countries like Australia (Bell and Ward, 2000) yet virtually all census data released are only for the usually resident population. The necessity in an increasingly mobile world is for us to recognise that the populations of many places vary between day and night, between seasons and between workdays and weekends and to be able to identify and analyse those different populations.

The growing scale of international migration (United Nations, 2006) also means that for some countries the concept of a national population needs to be reassessed in the light of the growing size and influence of expatriate populations. For some purposes the traditional view of a national population comprising people living within national borders on the night of a census enumeration needs to be modified to incorporate those citizens and nationals elsewhere. The nation-state may not be the appropriate “envelope” within which some analyses of national populations are conducted. With the exponential increase in scale and diversity of international population mobility and, in particular, the emergence of south-north migration as the most significant global mobility system, population geographers have been part of the burgeoning research effort seeking to understand it and provide informed policy direction to governments grappling with its implications. However, as in much other migration study, the focus has been on the destination end of the migration process rather than the origin. The bulk of our migration information is on immigrants and little is known about emigrants. However population geographers among others (e.g. Skeldon, 2005; Cohen, 1997)

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<sup>1</sup> A government owned agency focused on assembling and distributing fundamental spatial data.

have shown that expatriate populations can and do have positive developmental impacts on regions and countries of origin. Countries are increasingly considering policies which can facilitate and enhance this impact yet much of this is occurring in a knowledge vacuum because standard data collections tell us nothing about the size and composition of nations' diaspora. From the perspective of national census taking, expatriates are demographically similar to deaths in that information on the people involved cannot be obtained directly from them because they are not living within the national boundaries at the time the census is taken. In the case of both, information can be obtained directly from other family members still residing in the country but this will not obtain information on all emigration or all mortality.

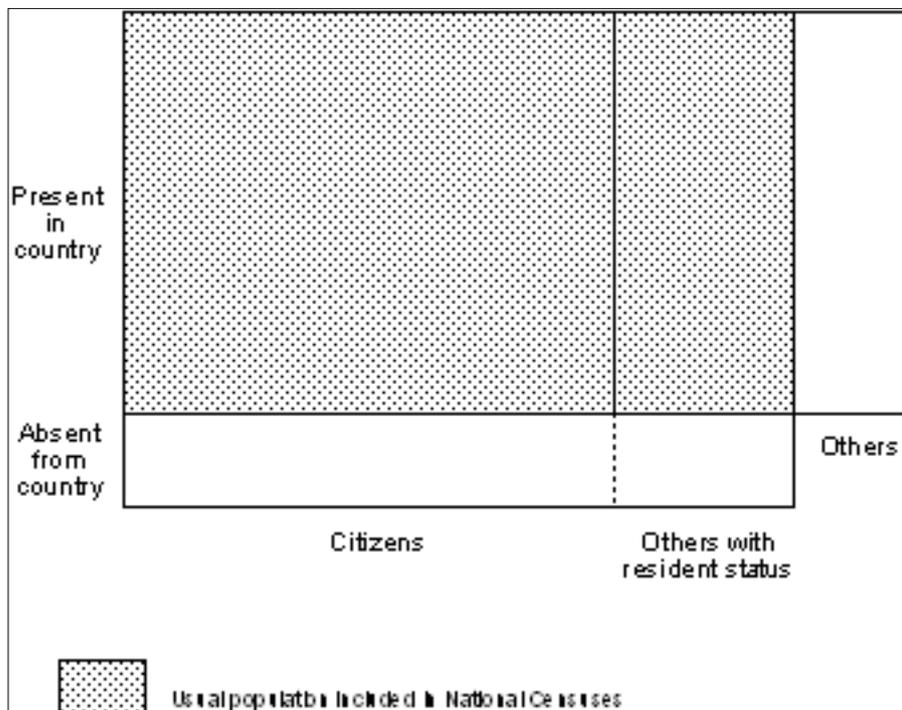
Diaspora represents a significant challenge to the concept of the nation-state since it implies that significant numbers of a nation's citizens increasingly do not reside within the national boundaries for significant periods of time, in many cases permanently (Castles 2003). In the sociology and international relations literature, accordingly, there is contemporary questioning of the nation state being considered the appropriate "envelope" within which many issues of significance should be studied. In demography there has been no such questioning. It is suggested here that there needs to be a similar debate within the discipline for at least two reasons. Firstly, research into national populations in some countries and for some purposes needs now to include national citizens and residents living and working abroad if it is going to be meaningful. Any consideration of Mexico's human resources, for example, which only includes those resident in Mexico on the night of a population census, will be a partial one. Secondly, demographers have considerable influence on the multilateral and national agencies responsible for population censuses and other important collections of economic, social and demographic data. These almost all are locked within the nation-state paradigm in terms of the information they collect and how they collect it. Accordingly, little information is collected on diaspora populations and this is a major constraint on research

designed to understand its dynamics and to develop relevant and timely recommendations on policy regarding it.

It needs to be stressed that the national populations, which are the basis of virtually all demographic analysis, are only one of several national demographics in a globalising world. This is depicted in Figure 10. In the diagram the shaded area indicates the national population enumerated in most national censuses. It includes:

- citizens resident on the night of the census;
- citizens absent on the night of the census but whose households provide information on them;
- permanent residents who are resident on the night of the census.

**Figure 10: Diagrammatic Representation of Different National Populations**



In many nations temporary visitors are not counted. However, there are also a number of persons who are citizens of the country (or permanent residents) who are living and working on a permanent or long term basis elsewhere and are excluded from the national enumeration.

Of course there is considerable variation between nations in the numbers in the two lower boxes of the diagram.

## **CONCLUSION**

In this paper the basic argument has been that where people live is an important influence on their behaviour. However, the extent to which this independent variable has in the past been able to be captured in census data has not been satisfactory. On the one hand the standard census data dissemination spatial units often fail to define units of analysis which are socially, economically or environmentally meaningful. On the other hand human settlement systems have undergone massive change in the last half century but this has not been accurately depicted in the rural-urban dichotomy classifications that can be employed. It is the argument of this paper that in the Australian context that recent developments in census geography have made it possible to develop more sophisticated, flexible and appropriate spatial units for research and policy analysis. We need to take advantage of these developments in social, economic and demographic analysis.

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