

Scoping study on regional transport in desert Australia

Raluca Raicu

Michael AP Taylor

Li Meng

Graham Currie

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Contributing author information

Raluca Raicu: Institute for Sustainable Systems and Technologies, University of South Australia

Michael AP Taylor: Institute for Sustainable Systems and Technologies, University of South Australia

Li Meng: Institute for Sustainable Systems and Technologies, University of South Australia

Graham Currie: Monash University

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For additional information please contact

Ninti One Limited

Publications Officer

PO Box 3971

Alice Springs NT 0871

Australia

Telephone +61 8 8959 6000

Fax +61 8 8959 6048

www.nintione.com.au

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All responsibility for the report and its contents lies with the authors.

List of shortened forms

AADT	Annual Average Daily Traffic
ABS	Australian Bureau of Statistics
APY	Anangu Pitjantjatjara Yankunytjatjara
ARA	Australian Railways Association
ARIA	Accessibility/Remoteness Index
ASPO	Australian Association for the Study of Peak Oil and Gas
BAH	Booz Allen Hamilton
CCD	Census Collector Districts
CHINS	Community Housing and Infrastructure Needs Survey
CRC	Cooperative Research Centre
DHAC	Department of Health and Aged Care
DOTARS	Department of Transport and Regional Services
DTEI	Department for Transport, Energy and Infrastructure (South Australia)
MRWA	Main Roads WA
NATSISS	National Aboriginal and Torres Strait Islander Social Survey
NTC	National Transport Commission
NTN	National Transport Network
PBS	Performance Based Standards
SLA	Statistical Local Area
TAFE	Technical and Further Education

Summary

This scoping report was prepared for the Desert Knowledge CRC in response to a number of stakeholders who had expressed concerns about the structural impediments that currently limit regional transport in desert Australia and between regional centres and outlying communities. Regional transport is generally seen by governments and businesses as a difficult and high cost exercise, without the flexibility required for the desert environment. The scoping study thus included consideration of the different approaches to regional transport that these institutions could implement to achieve better local mobility.

Three broad aims were identified for the study:

1. to identify structural impediments limiting regional transport in desert Australia and between regional centres and outlying communities
2. to examine the approaches available to achieve better local mobility
3. to identify the significant research issues requiring further consideration.

The study concluded that the major issue for regional transport in desert Australia is the vulnerable nature of the mobility experienced by Aboriginal communities and people. The available research suggests that Aboriginal people are highly mobile in their day-to-day lives, travelling to visit one or more places for short periods of time and then returning to their home communities. At the same time the level of mobility is largely localised, taking place within a specific cultural framework or regional area. Kinship provides the great driving force behind the mobility. Fragility arises because of the reliance on the private car as the transport means to provide that mobility. Given that the vehicles used by Aboriginal people in desert Australia tend to be of advanced age, in poor condition, poorly maintained and perhaps used in unsafe ways (such as overloading in terms of numbers of vehicle occupants), breakdowns are common and the users may not be able to readily undertake repairs. Individuals and groups can then easily become stranded and without the necessary resources to take other transport alternatives.

This issue is further exacerbated by the poor condition of much of the road network and the general absence of public transport services. Unsealed roads can present particular problems under adverse weather conditions, when traversing a road may become difficult, if not impossible, for significant periods of time (days, weeks and possibly months). Poor road surfaces lead to more wear and tear on vehicles. The lack of public transport links between population centres restricts the ability of people without cars to move around, and significantly reduces the alternatives available when cars are unavailable or inoperable. Thus transport in much of desert Australia is relatively difficult because of the sparse road networks, long travel distances and poor condition of roads and vehicles. Further, access to services and facilities, both public and private, is also restricted, especially when compared with the levels of access demanded in more densely settled regions.

The future situation is likely to deteriorate further. The costs of motor vehicle ownership and use are likely to increase significantly in the next few years, increasing the burdens on low income people. For example, the effects of 'peak oil' (point of maximum oil extraction) and climate change adaptation will be seen in higher fuel prices. Given that fuel prices in remote areas are already high by national standards, the effects of further price increases will be most sorely felt in such areas. Questions about personal debt and car ownership, including the wider costs of vehicle ownership and total levels of expenditure on vehicles, will become of increasing concern. In addition, while older vehicles based on 'simple' vehicle technologies have been amenable to servicing and maintenance by untrained but

interested people, more modern vehicles – which have increasingly complex engine, fuel, transmission and braking systems – require higher levels of expertise and equipment to perform servicing and maintenance tasks. As these vehicles age and are passed along the chain of vehicle ownership in society, so existing problems of vehicle reliability will be exacerbated and new problems will emerge.

An affordable public transport system for remote areas in desert Australia is essential, and will become increasingly so as increased vehicle complexity and fuel prices affect the overall affordability of motor vehicles. Investigation of how to provide public transport alternatives must be a primary consideration. There is evidence that scheduled fee-for-service transport – when designed to account for group travel and low fares – is a feasible solution, but further investigation is required. In particular, the methods for evaluation of such transport services need to be revised and extended. Any economic analysis (e.g. cost-benefit analysis) will need to account for the reality of present travel conditions and behaviours in remote areas, which may be quite different from those experienced elsewhere. A preponderance of unregistered vehicles, traffic offences and traffic injuries and fatalities needs to be taken into account in an economic analysis, whereas this would not necessarily be the case in more settled areas.

The above issues lead to a number of research questions that can be formulated into a research agenda on regional transport in desert Australia:

1. formal conceptualisation of ‘the community’ as a regional network of kin and settlement centres, in which individuals are constantly mobile. This perspective will provide for the proper consideration of policy, service provision and economic development for communities in remote areas
2. data collection on Aboriginal population mobility, including fine grained quantitative data collected over reasonably long time periods, as well as qualitative information, that may then be used to shape policies, programs and services. ABS census data is of limited analytical utility in these considerations. This research will include the refinement and extension of the tools for data collection and analysis, including the development of tools that can fully model ‘circular movement’ and can capture variations in timing, duration and frequency of travel for different Aboriginal regions, as well as the spatial patterns involved. A review of the transport resources and services available in remote communities should be included. Transport provided for access to schools is a major component of government transport provision in rural Australia, so investigating access to school in remote communities may be a useful way to better understand travel behaviour and the availability of transport resources
3. detailed study of the road safety situation affecting travel in remote areas, as opposed to the more general road safety analysis that may not account for the specific features of road travel in remote areas. Crash frequency and severity and measures of exposure (e.g. vehicle kilometres of travel in remote area road networks by vehicle type) would be part of such studies, as would research on the behaviour and attitudes of road users resident in remote areas
4. development of asset management systems that provide information on the state of the road network in desert Australia, particularly for secondary, unsealed roads in that network (on the basis that the primary roads and highways will already be included in existing asset management systems)
5. methods for the economic and social evaluation of transport service provision, especially public transport services, that account for the actual performance of the existing transport system and the behaviour of the study area population, and consider the range of non-transport impacts (including health and crime and justice impacts) of the transport system
6. the development of alternative scenarios for wider (or even global) influences on the operation of transport systems in remote areas, including ‘peak oil’ and climate change adaptation, which can then be used to set parameters for the long-term study of remote area transport system performance

7. study of potential transport options to help overcome known deficiencies in existing transport service provision, especially the occurrence of ‘stranded’ people well away from their home settlements. Options would include ‘sweeper buses’, alternative fare structures, transport vouchers, car sharing schemes, combined freight and passenger services, transport maintenance capacity building, the development of appropriate information services, and driver education programs for remote communities. A review of the potential for outreach of services versus centralisation would also be useful
8. exploring transport-related disadvantage in remote communities. Access to transport is a major barrier to social and economic participation in remote communities. It is therefore necessary for research to explore the nature of these barriers and to identify how they impact on community life and wellbeing in remote communities. This work should be able to establish the relative significance of transport barriers to the wider issue of social disadvantage in remote communities.

The main recommendation of this scoping study is that the Desert Knowledge CRC adopts this research agenda as a key component of its future research programs and promotes it among the relevant public sector agencies with responsibilities for transport planning and operations. The involvement of other agencies, including education, health, crime and justice should also be considered, perhaps leading to a ‘whole of government’ approach to the question of providing safe, efficient, equitable and appropriate transport services in desert Australia.

1. Introduction

The Desert Knowledge CRC was approached by a number of stakeholders to support a scoping study addressing the structural impediments that currently limit regional transport in desert Australia and between regional centres and outlying communities.

Regional transport is generally seen by governments and businesses as a difficult and high cost exercise, without the flexibility required for the desert environment. This scoping study thus included consideration of the different approaches to regional transport that these institutions could implement to achieve better local mobility.

The objectives of the scoping study were to:

1. review existing studies on regional transport in both the private and public sectors in desert Australia, taking account of overseas experience in providing insights for solutions
2. review existing studies on Aboriginal mobility and the importance of regional transport in desert Australia
3. canvas the business and public sectors in desert Australia to determine appropriate approaches that have worked or not worked, and why
4. synthesise the above to provide recommendations on approaches to regional transport alternatives, including analysis of and recommendations on how both the private and public sectors can engage with the resident Aboriginal population to develop regional transport opportunities
5. identify any significant research issues that might contribute to the realisation of better regional transport outcomes in the future.

Three outputs were required from the study:

1. a comprehensive report on issues and solutions for regional transport in desert Australia
2. a two-page (maximum) report in plain English outlining the findings of the research
3. a workshop reporting the findings to key stakeholders.

The report provides the first two of those outputs, with its summary being the two-page report outlining the findings of the research. A workshop to present the findings to key stakeholders will be staged at a later date.

2. Aims and issues

An examination of the objectives for the scoping study led us to identify three broad aims, for each of which a number of issues were apparent. The broad aims, which provided the key aspects for inclusion in the scoping study, were:

1. to identify structural impediments limiting regional transport in desert Australia and between regional centres and outlying communities
2. to examine the approaches available to achieve better local mobility
3. to identify the significant research issues requiring further consideration.

The aims and their specific issues may be summarised as follows.

Aim	Specific issues related to the aim
Identification of structural impediments limiting regional transport in desert Australia and between regional centres and outlying communities	• Vehicle availability and accessibility • Poor roads • High transport costs • Distance • Lack of passenger transport (bus/plane/car sharing) • Transport and general service providers – capacity building • Centralisation strategies and impacts on travel • Population growth • Transport futures, including ‘peak oil’ and climate change adaptation, and their likely impacts on regional and remote areas
Examination of the approaches available to achieve better local mobility	• Vehicle sharing • Road planning • Road safety • Passenger transport provision (e.g. air to bus post) • Subsidies • Transport vouchers • Outreach • Definition of mobility aspirations and consensual models • Localised capacity building • Structure and location of settlements
Identification of possible significant research issues requiring further consideration	• Links between travel, wellbeing and social exclusion • Degree of local/regional mobility, including transport modes, volumes for each mode, sharing and timing • The need for travel, and the reasons and motivations behind the need • Settlement locations and structures • Illegal driving habits, and their causes and motivations • Debt and vehicle ownership, including the wider costs of vehicle ownership and tracing expenditures on vehicles • Transport futures and remote travel (including the likely impacts of and scenarios for ‘peak oil’ and climate change adaptation)

Consideration of the issues in the context of each of the broad aims identified above then provided the basic framework for the literature review and related investigations, as discussed in the subsequent chapters of this report.

3. Transport networks of desert Australia

A starting point for the scoping study is to define the existing transport networks in desert Australia. Three mode-specific networks are found:

1. the road network
2. the rail network
3. the civil aviation network.

Of these, the road network provides the most comprehensive level of coverage for the remote desert areas. Coverage by the rail network is largely limited to the two major national rail lines, east–west from Perth to Port Augusta and then on to Sydney and Adelaide, and north–south from Darwin to Port Augusta (with connections to Sydney and Adelaide). The Queensland rail network extends as far west as Mount Isa, and there are the iron-ore carrying railways in the Pilbara region of Western Australia. The civil aviation network comprises the connections between the major (capital) cities and regional air services which operate between the capital cities and regional centres, with some services between regional centres.

The following maps help to define these networks and indicate some of the possible connections between them.

Figure 3.1 shows the long distance railway network for Australia, and indicates its components in terms of standard gauge, broad gauge and narrow gauge lines.

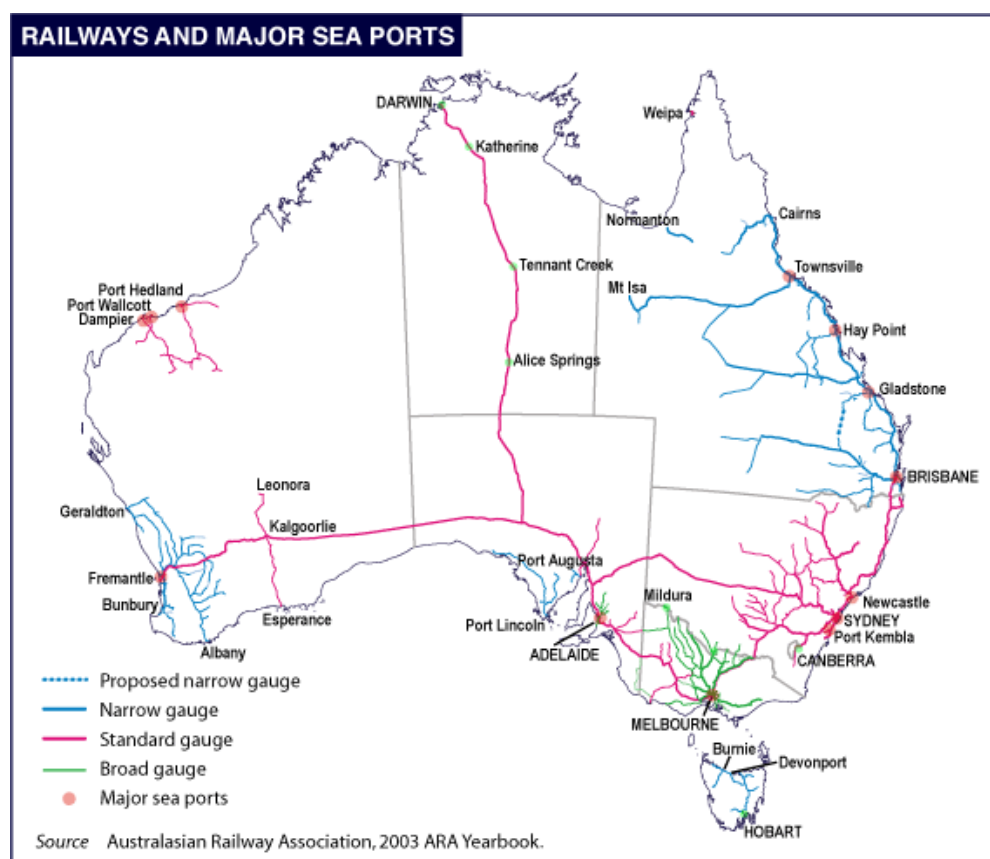


Figure 3.1: Australia's long distance rail network

Source: ARA 2003

As indicated previously, this rail network provides minimal coverage for the remote desert regions. Spatial coverage is naturally limited to the corridors along the rail lines, with limited numbers of stations provided. Travel to most distant locations requires transfer to another mode, either road or perhaps air. Long-distance passenger services (e.g. The Ghan and The Indian Pacific) operate on the north–south and east–west standard gauge lines and largely provide for tourist travel between a small number of centres along those lines. Most of the traffic on the rail lines is long-distance freight.

The civil aviation network is less well defined by its very nature, but has the capability to provide for much wider coverage in remote areas, albeit at high cost. Research by the then Bureau of Transport and Regional Economics (Lim & Gargett 2007) has indicated the levels of cost and the fragility of air services, especially in the more remote areas where population density and hence travel demand is very low. Figure 3.2, from Lim and Gargett (2007), indicates the coverage provided by the national civil aviation network, in terms of spatial access to airports.



Figure 3.2: Access to air services in Australia in 2005

Source: Lim and Gargett 2007

The white circles in Figure 3.2 show coverage areas of 120 km radius around recognised airports. The red dots indicate urban centres and localities (as defined by the Australian Bureau of Statistics (ABS), i.e. as population centres with at least 200 inhabitants). The red dots that are visible on the map are therefore regarded as urban centres not having reasonable access to air services. This is not to say that accessibility to air travel is not possible for these localities, but rather that they are not within easy reach of scheduled commercial air flights.

Lim and Gargett (2007) drew the following conclusions from their study:

- the challenges to the economic utility of air service provision in regional and remote areas of Australia are:
 - the greater infrastructure requirements per head of population required in regional and remote areas
 - the absence of economies of scale, or at least fewer opportunities for economic gains
 - a lack of competitive pressures on service providers
 - a lack of access to the benefits from agglomeration of other economic systems
- the small population base of remote area communities rarely generate sufficient passenger demand for airlines to cover their costs, unless there are specific economic activities and income levels (e.g. from mining or tourism) that may then provide both an incentive to provide services by airlines and a willingness to pay by passengers
- air services to small or medium-sized communities are increasingly dependent on the ability of commercial operators to provide efficient services to the low-density market regions, and these

operators are also showing less willingness to cross-subsidise these services from their more profitable routes, due to wider economic pressures.

Specialist air services, for medical treatment and other emergency needs, continue to play an important role in remote areas, but require strong external support, most likely from governments.

The road network provides the highest degree of coverage in remote areas and indeed provides the fundamental infrastructure for transport and travel in remote areas. However, it must be realised that there is more than one road network. In fact, a set of networks are overlaid on top of each other, although they are connected. These road networks are of different design and operational standards, they are administered by and the responsibility of different agencies, and the funding resources available to construct and maintain the networks are quite different.

The basic skeleton of the overall road network is the National Transport Network (NTN) road system as defined in the AusLink White paper (DOTARS 2004). The NTN network may be seen in Figure 3.3.



Figure 3.3: The National Transport Network (NTN) road system network in Australia

Source: DOTARS 2004

This network provides spatial coverage similar to that of the national rail network (the AusLink components of which are also shown in Figure 3.3). The NTN roads are funded directly by the Australian Government although they are administered, constructed and maintained by the respective state and territory road authorities on behalf of the Australian Government. These roads are of

relatively high design standard, which at a minimum level (that to be found in the remote areas) will be a sealed carriageway with two traffic lanes, one for each direction of traffic flow, and designed to a reasonable geometric standard and hence safety level (although this is arguable). The sealed road, as discussed throughout the remainder of this report, is the key to good mobility and accessibility as it provides for safe and efficient traffic operations in almost all weather conditions (flooding notwithstanding).

The next level of the road network includes the declared highways and main roads, which are the province of the state and territory road authorities, with most funding for these roads provided by the Australian Government. The remainder of the road network is local roads, which fall into the jurisdiction of local government. Especially in remote areas, these roads are likely to be of lower design standard and, in regional areas of low population and in remote areas, are likely to be unsealed.

An idea of the overall serviceable road network in remote and regional Australia is provided by the current work of the National Transport Commission (NTC) in its development of the Performance Based Standards (PBS) system for heavy vehicles (NTC 2009). Figure 3.4 shows the PBS network at the national level, which provides an indication of the coverage of the road network in remote areas.

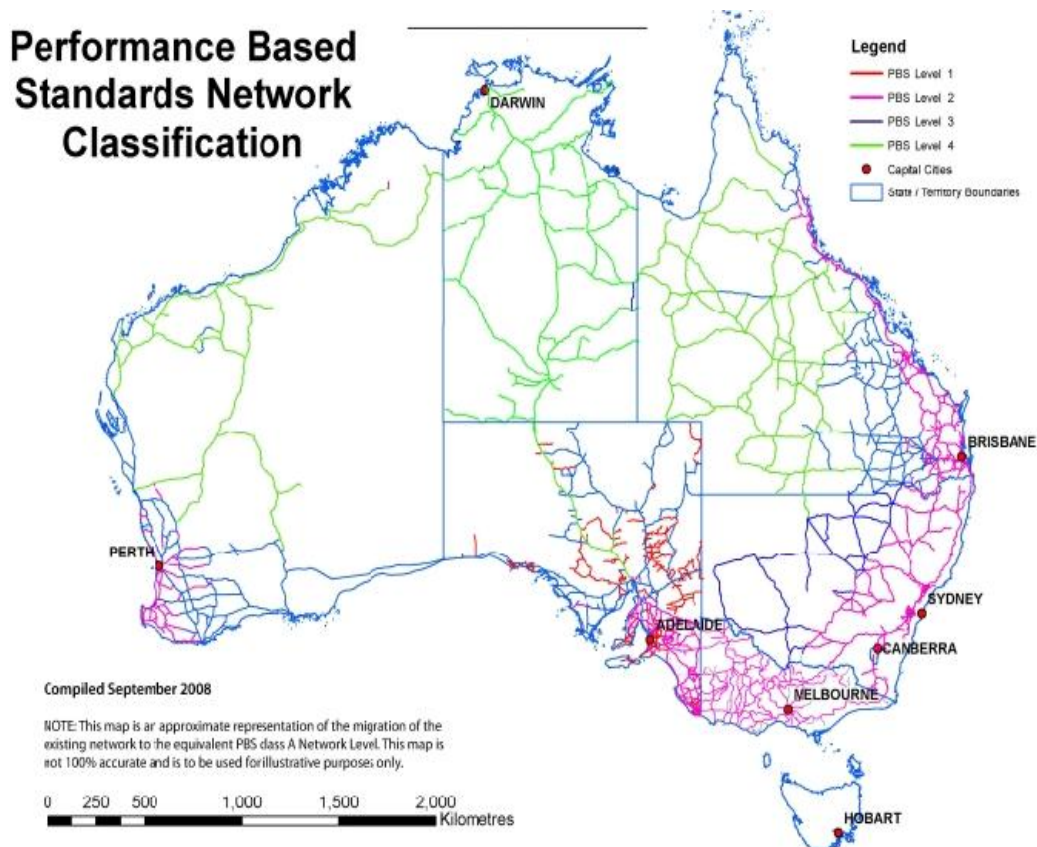


Figure 3.4: The defined Performance Based Standards (PBS) road network in Australia, showing PBS Level 1, 2, 3 and 4 roads

Source: NTC 2009

The PBS road network caters for four levels of network access by heavy vehicles, and accounts for the very large vehicles (e.g. B-doubles and road trains) for which access to the road network may be strictly limited, especially in highly populated areas. The PBS system is designed to give greater flexibility and productivity to freight vehicle operators while providing and defining suitable design standards for the roads on which those vehicles operate. The four levels of access are defined in Table 3.1.

Table 3.1: PBS network access levels, scheme vehicles, and access to other transport modes

Road class	(Present day) vehicle description	Level of access to other transport modes
Level 1 access (L1)	From passenger cars to single articulated trucks	Access to all rail, sea and air terminals, and also to transport hubs such as a road/rail interchange
Level 2 access (L2)	B-double	Access to most rail, sea and air terminals, and also to transport hubs such as road/rail interchanges
Level 3 access (L3)	Double road train (Type I)	Access to some rail, sea and air terminals
Level 4 access (L4)	Triple road train (Type II)	Access to specific rail, sea and air terminals

The Level 1 road class represents general access to the road network. It requires vehicles to meet more stringent standards than those seeking access to other parts of the road network, i.e. Level 2, Level 3 or Level 4 roads. In general, Level 1 roads are located in the more densely settled regions of the nation, including urban areas. Level 2 roads in those areas will tend to be higher standard roads, such as freeways, expressways and major arterial roads which have the geometric and structural capabilities to accommodate large vehicles, specifically B-doubles. The jurisdictions responsible for the Australian road network are involved in the process of classifying their road networks according to the PBS four-level system, and most states have now published their networks (as in Figure 3.4).

Figure 3.4 indicates that the Level 3 and Level 4 roads provide the majority of the main road access in remote desert Australia, which is consistent with the usage of road trains. Of course, even this network does not describe the full extent of the road network in the remote areas, but what it is intended to do is to indicate the roads deemed suitable for heavy vehicle usage. A noticeable omission from the (Level 4) network in Figure 3.4 is the section of the (proposed) road from Kalgoorlie to Alice Springs through eastern Western Australia.

The predominance of the unsealed road as the basic transport corridor in desert areas will be seen to be a major issue presently limiting access and mobility for remote communities. The ease of degradation of an unsealed road and its vulnerability to weather events mean that such roads can quickly suffer from reduced serviceability, with poor and possibly unsafe operating conditions. Some research on the nature of the changing serviceability of unsealed roads has been reported (e.g. Giummarra 2001), but even this work was directed more to unsealed roads in temperate areas (of Victoria). There is great scope for consideration of the design and properties of unsealed roads in desert areas.

4. Location of Aboriginal populations

4.1 Population in Aboriginal lands

The 2001 Census indicated that Aboriginal and Torres Strait Islanders comprised about 2.4 per cent of the Australian population, or about 458 520 people. They had a median age of 20.5 years, substantially less than the 36 years for the rest of the population. About one quarter of the Aboriginal and Torres Strait Islander population lived in ‘remote’ or ‘very remote’ areas, whereas only two per cent of the non- Aboriginal and Torres Strait Islander population live in such areas (ASPO n.d.).

Table 4.1 shows the distribution of the Aboriginal and Torres Strait Islander population in Australia (ABS 2003).

Table 4.1: Estimated Aboriginal and Torres Strait Islander population of Australia – 30 June 2001

Jurisdiction	Aboriginal and Torres Strait Islander population	Proportion of Aboriginal and Torres Strait Islander population	Proportion of jurisdiction population
ACT	3 909	0.9%	1.2%
New South Wales	134 888	29.4%	2.0%
Northern Territory	56 875	12.5%	28.8%
Queensland	125 910	27.4%	3.5%
South Australia	25 544	5.6%	1.7%
Tasmania	17 384	3.8%	3.7%
Victoria	27 846	6.1%	0.6%
Western Australia	65 931	14.4%	3.5%
Australia	458 520	100%	2.4%

Based on data from the Australian Bureau of Statistics (ABS) *Community Housing and Infrastructure Needs Surveys* (CHINS) report (ABS 2003), future challenges to these Aboriginal communities have been identified.

For example, Taylor et al. (2006) projected a rise in the Aboriginal share of total population from an estimated 22.8 per cent in 2006 to 27.5 per cent in 2021 in the arid zone, from 14.5 per cent to 18.2 per cent in the semi-arid zone, and from 19.3 per cent to 20.8 per cent in the savannah (Figure 4.1).

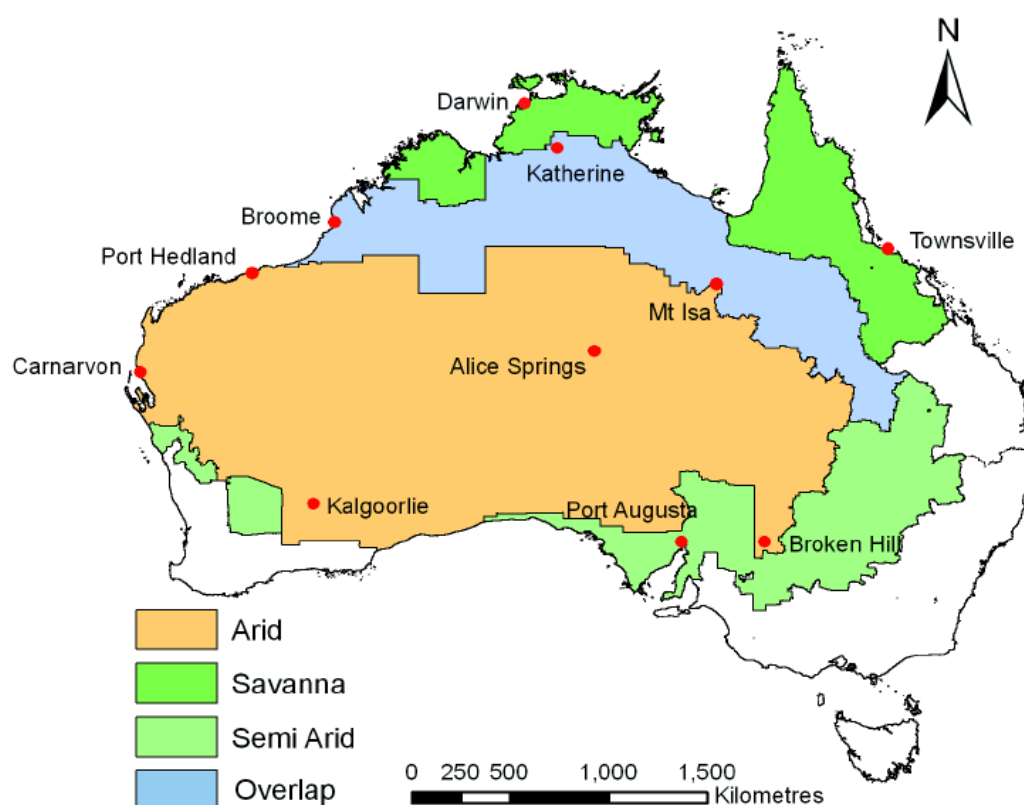


Figure 4.1: Location of arid, semi-arid and savannah regions of Australia

Source: Taylor et al. 2006

For the Aboriginal population of the arid zone, growth is evident in all age groups but the highest increase is expected among those aged 45–64 years. Growth among the school age and transition-to-work age groups is projected to be relatively low.

Projections of the non-Aboriginal population in the arid zone showed the only age groups projected to increase are those over 45 years, with almost all of this increase expected among those aged 65 years and over. All age groups below 45 years undergo decline.

According to Taylor et al. (2006) the arid zone age composition will shift from a predominantly youthful and non-Aboriginal population to one that is increasingly aged and Aboriginal.

Similar changes in age and Aboriginal composition are projected for the semi-arid zone.

In contrast to the arid zones, all age groups are projected to increase in the savannah with the exception of non-Aboriginal children under 14 years of age.

Figure 4.2 presents the geographic outcome of projected total population change by Statistical Local Area (SLA).

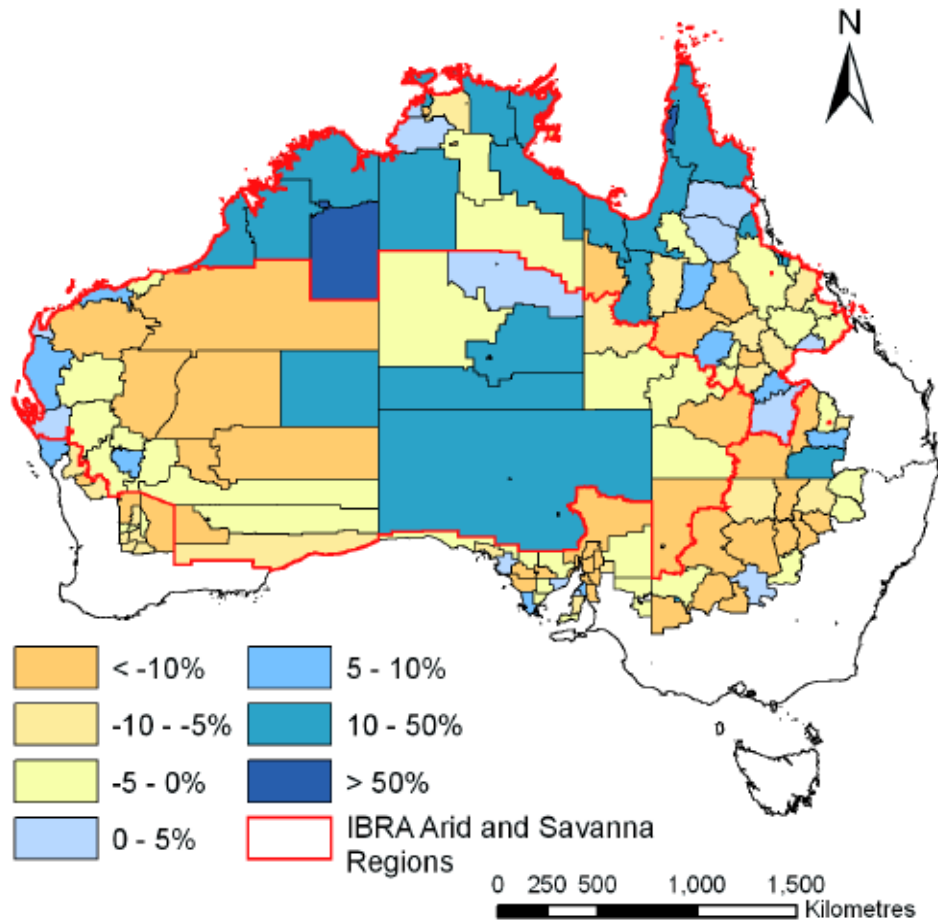


Figure 4.2: Per cent total population change by Statistical Local Area, 2006–2021

Source: Taylor et al. 2006

It also appears that a number of localised areas within the arid zone and savannah stand out as the focus of relatively large absolute and percentage increases in population. The problem will be how to accommodate this population growth and how to ensure they will be able to access cost-efficient transport services.

4.2 Population in urban areas

While the majority of Aboriginal peoples worldwide still live in rural areas, they are increasingly migrating to urban areas, both voluntarily and involuntarily. This is a reflection of the growing trend of global urbanisation, whereby the majority of the world's population will soon live in cities.

Factors that contribute to Aboriginal peoples' urban migration include land dispossession, poverty, militarisation, natural disasters, lack of employment opportunities, the deterioration of traditional livelihoods combined with the lack of viable economic alternatives, and the prospect of better opportunities in cities.

This excerpt from the United Nations Permanent Forum on Indigenous Issues (n.d.) illustrates the extent of urban migration by Indigenous peoples around the world:

Country examples

In **Mexico**, where the Indigenous population was estimated at 12.4 million in 2000 (12 per cent of the total population), almost one in every three Indigenous people lives in a city.

- Illiteracy rates among the urban Indigenous population are four times higher than non-Indigenous city-dwellers.
- Indigenous people living in cities have been found to drop out of school to seek employment earlier than their non-Indigenous counterparts. This leads to a pattern of working in poorly paid, low-skilled jobs, with 50 per cent of the Indigenous population earning an income of between \$150–\$300 per month.
- Urban Indigenous [people] generally live in lower quality housing, with more than one-third of Indigenous homes in Mexico city having only one room and a higher proportion of Indigenous homes incorporating asbestos sheeting (16.1 per cent compared with 9 per cent of non-Indigenous housing).

In the **Philippines**, Indigenous peoples typically migrate to cities as a result of a loss of livelihood, lack of social services or due to tribal conflicts. Due to their limited skills and education, they often face unemployment and poverty. For example, in the northern Philippine city of Baguio (where over 60 per cent of the population is made up of Indigenous peoples from the Cordillera region), it is estimated that some 65 per cent of Indigenous migrants suffer from extreme poverty.

In **Africa**, forced migration to urban areas has often resulted from land loss due to the creation of wildlife reserves and the construction of dams, mining projects or other development projects.

In **Tanzania**, 90 per cent of Masaai men who have migrated to the capital city, Dar es Salaam, end up working as security guards, earning around \$40 per month and are often only able to afford to live in slums on the outskirts of the city.

In **India**, where it is estimated that Indigenous peoples (called “Scheduled tribes”) make up 8.2 per cent of the total population, Indigenous migration to cities has been involuntary as well as, increasingly, voluntary (for better education opportunities for example). Negative impacts of urban migration on Indigenous peoples in India have included cultural erosion, loss of language, exploitation and discrimination.

In **Canada**, it is estimated that more than 50 per cent of the Indigenous population now live in cities with reasons given for their migration including family and housing, as well as education (for those migrating from reserves) and employment (for those migrating between cities). There is a high level of mobility among the Aboriginal population from city to city and between cities and reserves, which can have a disruptive effect on the provision of social programs such as health, education and family support.

Aboriginal peoples who migrate to urban areas face particular and often additional challenges, most prominently unemployment, limited access to services and inadequate housing. In addition, Aboriginal peoples in urban areas may experience discrimination and have difficulties in sustaining their language, identity and culture and educating future generations, which can result in a loss of Aboriginal heritage and values. As Mick Dodson (1993), Australian Aboriginal leader and member of the Permanent Forum, said, ‘Removed from our land we are literally removed from ourselves’.

However, migration can also be a positive experience, providing more and better opportunities for Aboriginal peoples in the area of employment and education, with income generated by urban Aboriginal peoples often used to support families in their communities of origin.

In some instances, Aboriginal peoples have been able to adapt and improve their situations, preserving their Aboriginal identities while maximising the benefits of urban society (United Nations Permanent Forum on Aboriginal Issues, n.d.).

5. Travel demand

5.1 Isolation, disadvantage

Australia's Aboriginal population is a population that suffers a significant transport disadvantage (Currie & Senbergs 2007). Australia's Aboriginal communities are commonly located in fringe urban areas, or in outer regional/remote Australia where population density is low (Figure 5.1). These areas are characterised by isolation in terms of access to facilities and services, low socioeconomic status of people living there, large distances and poor roads, all exacerbated by lack of transport options for those without access to a car. These factors can also result in isolation even in urban areas.

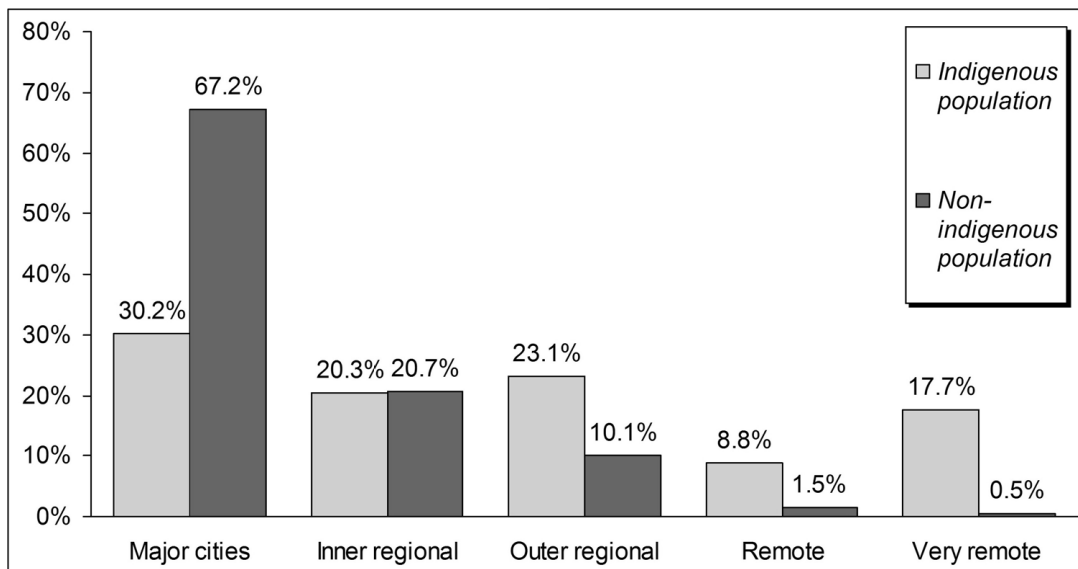


Figure 5.1: Location of population by remoteness area

Source: ABS 2001

5.2 Accessibility issues

5.2.1 Transport to access services

The main mode of transport used by remote Aboriginal communities to access key government and community services is by car (Taylor et al. 2006). Figure 5.2 indicates the patterns of journeys undertaken by residents of Aboriginal communities in arid and savannah Australia. People from 49 per cent of these communities must travel for between 1 and 4 hours to reach the services, and 16 per cent of people reported travel times in excess of five hours. Due to variable weather conditions, road access into or out of communities may be cut for periods of up to one week, four or five times per year. In

some cases (37 communities), there have been continuous periods of road closure for up to three months or more in the most extreme weather conditions.

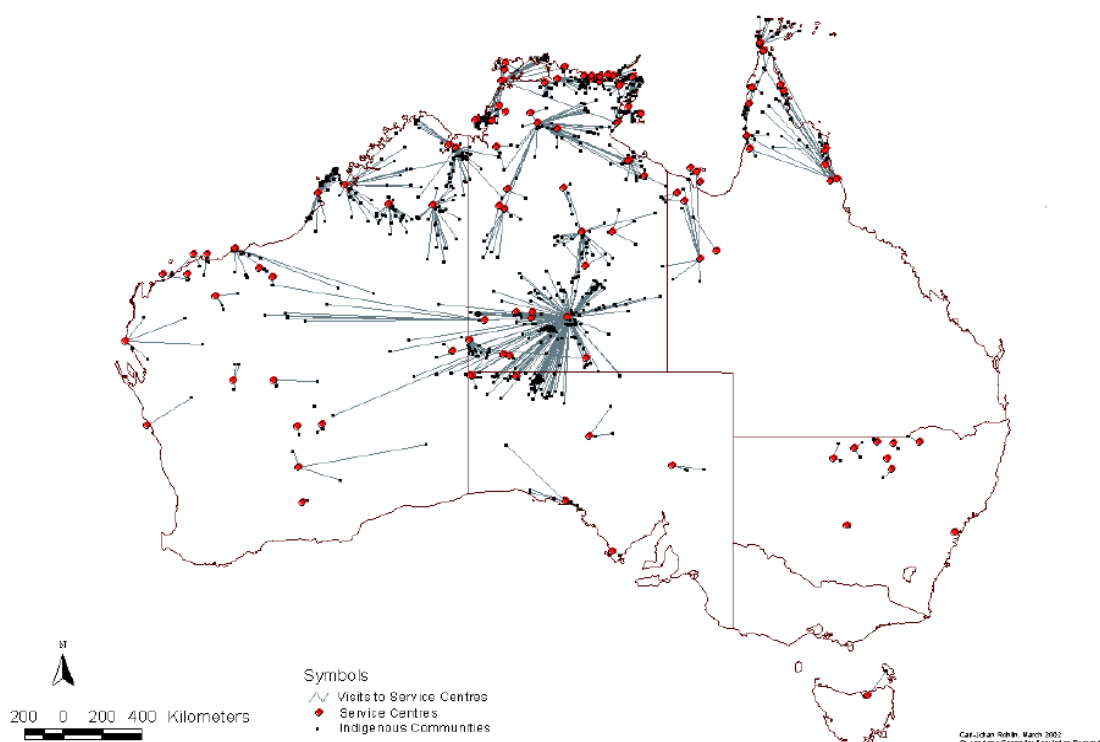


Figure 5.2: Journey to services from discrete Aboriginal communities in arid and savannah Australia

Source: Taylor et al. 2006

5.2.2 Health and access to medical services

These large distances affect Aboriginal health: 895 (69 per cent) of the 1291 discrete communities are 100 km or more away from the nearest hospital, and only 53 per cent of these communities have access to emergency air medical services. People from these communities have to travel large distances to access even non-critical health infrastructure; for example, nearly 50 per cent of communities in WA, SA and NT have to travel over 25 km to access health centres (Table 5.1). However, lack of transport can hinder access to clinics, even if distances are relatively short.

Table 5.1: Distance to nearest hospital and community health centre – 2001

		NSW	Qld	SA	WA	NT	Australia
Discrete communities located less than 10 km from nearest hospital	no.	33	22	11	27	34	127
Discrete communities located 10 km or more from nearest hospital							
Distance to nearest community health centre							
Less than 25 km	no.	17	48	43	117	254	481
25 km or more	no.	10	72	42	139	342	606
Total	no.	27	120	85	256	596	1 087
Total number of communities (a)	no.	60	142	96	283	632	1 216
Total population (a)	no.	7 771	30 961	5 226	16 558	47 233	108 085
Proportion 10 km or more from nearest hospital and 25 km or more from nearest community health centre							
Communities	%	16.7	50.7	43.8	49.1	54.1	49.8
Population	%	9.9	3.0	14.7	17.4	12.7	10.7

(a) There are no discrete Aboriginal or Torres Strait Islander communities in the ACT, Tasmania and Victoria included in the total

Source: ABS, 2001 CHINS

5.3 An Accessibility/Remoteness Index (ARIA+)

One consequence of the poor access of communities in remote areas to both public and private services and facilities has been the development by the federal government of a remoteness index (ARIA, the Accessibility/Remoteness Index of Australia) as a metric to describe the overall level of accessibility (or, more properly, remoteness) experienced by any given community according to its geographic location and degree of separation from population centres.

The ARIA+ metric (DHAC 2001) is an index of remoteness derived from measures of road distance between populated localities and service centres. These road network distance measures are then used to generate a remoteness score for any location in Australia. ARIA+ is a continuous varying index with values ranging from zero (high accessibility) to 15 (high remoteness), and is based on road network distance measurements from populated localities to the nearest service centres, where there are five size categories for service centres based on their population. The five distance measurements, one to each level of service centre, are recorded for each populated locality and standardised to a ratio by dividing by the national mean for that category. After applying a capped maximum value of three to each of the ratios, these are summed to produce the total ARIA+ score for each populated locality.

An interpolation procedure is used to interpolate the index values for each of the localities to a 1 km grid so that all areas of Australia record an index value. Using the interpolated grid surface, scores for larger areas such as Census Collector Districts (CCD) and Statistical Local Areas (SLA) can be derived (GISCA n.d.). Susilawati and Taylor (2008) have shown how the ARIA+ index can be used to study the social and economic vulnerability of regional and remote communities and areas in terms of the condition of the road network.

ARIA+ is seen as having the following advantages for application to sparsely settled regions (DHAC 2001):

- it is a purely geographic measure of remoteness, which excludes any consideration of socio-economic status, rurality and population size factors (other than the use of natural breaks in the population distribution of urban centres to define the service centre categories)
- it is flexible and can be aggregated to a range of spatial units, used as a continuum or classified
- it is stable over time.

DHAC (2001) indicates that, as an index of remoteness that covers the whole of Australia, ARIA+ provides a measure of remoteness (or accessibility to services) that is suitable for a broad range of applications including community service planning, demographic analysis and resource allocation. Service centres are defined as populated localities (towns and cities) where the population is greater than 1,000 persons. There are five categories of service centre used at destinations, which are split in terms of population as shown in Table 5.2, with each category assessed as having distinct levels of public and private sector facilities available (e.g. health, social welfare, education, finance and banking, retail, etc). In addition, under ARIA++, a category F service centre (population 200–999) can also be identified (GISCA n.d.).

Table 5.2: ARIA+ Service Centre Categories A–E (DHAC 2001)

Service Centre category	Population
A	≥250 000
B	48 000 – 249 999
C	18 000 – 47 999
D	5 000 – 17 999
E	1 000 – 4 999

The ARIA+ index is calculated by considering the distance by road from a locality i to the nearest service centre in each category (x_{iL} for category L , for $L = A, B, C, D, E$). Then

$$ARIA+_i = \sum_L \min\left\{3, \frac{x_{iL}}{\bar{x}_L}\right\}$$

where $\bar{x}_L$ is the mean road distance of all localities to the nearest category L service centre. An upper limit of three on the ratio between x_{iL} and $\bar{x}_L$ was imposed by the developers of ARIA+ to remove the effects of any remaining extreme values from the index (GISCA n.d.). With this upper limit, the maximum value of $ARIA+_i$ is 15, and this represents an extremely remote location. Values of $ARIA+_i$ are thus in the range $[0, 15]$. In the calculations, if a higher category service centre (say category A) is closer to a given locality than (say) a category B centre, then the higher category centre takes the place of the lower category centre in the calculations. Note that ARIA+ is intended for regional and remote area analysis only – for instance all urban centres with populations of 250 000 or more automatically have a zero value of their ARIA+ index. Once the index values are calculated, then each location can be classed according to a remoteness category, comprising ‘highly accessible’, ‘accessible’, ‘moderately accessible’, ‘remote’ and ‘very remote’. The higher the ARIA+ value, the more remote the location.

The ARIA+ index and its extensions have been used in a number of studies to examine people’s access to a variety of services. For example, GISCA (2002) examined the distribution of access to schools, police, pharmacies, hospitals and banking and financial services. Figure 5.3 shows the national distribution of banking and financial service points of presence on a backdrop of the ARIA+ remoteness categories across the nation (GISCA 2002).

ARIA+ provides a powerful metric for establishing the relative degree of remoteness of communities and settlements, which is in widespread use following its adoption by the Commonwealth Government as a 'whole of government' measure. Its use of the road network distance as a measure of separation also links it strongly to the transport system, especially in an environment such as desert Australia where the road network provides the basis of much regional transport service (with the obvious exception of air transport, all other transport modes in desert Australia for regional use are largely dependent on the road network as basic infrastructure).

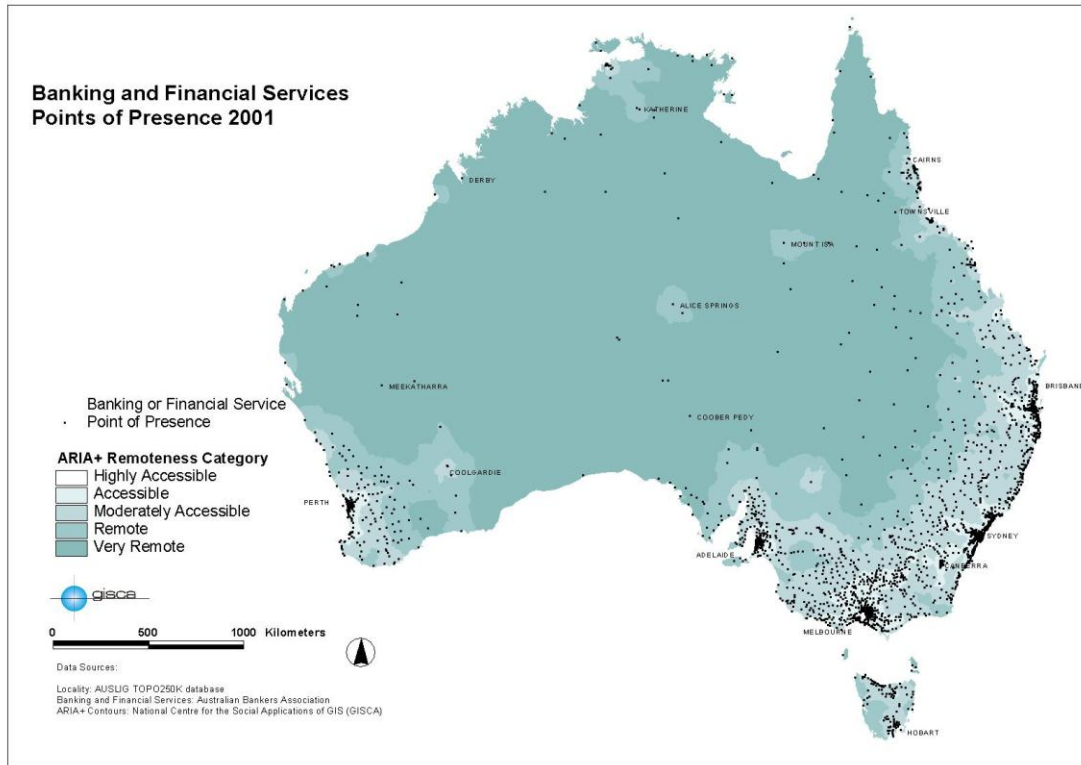


Figure 5.3: Banking and financial service points of presence and level of remoteness as measured by the ARIA+ index

Source: GISCA 2002

Figure 5.4, also from GISCA (2002), shows the relative proportions of selected service points of presence (for pharmacies, banking and financial services, schools, police and hospitals) by ARIA+ remoteness category. It shows a degree of imbalance in remote areas between the provisions of public services (schools, police and hospitals) and private services (pharmacies and banking and financial services).

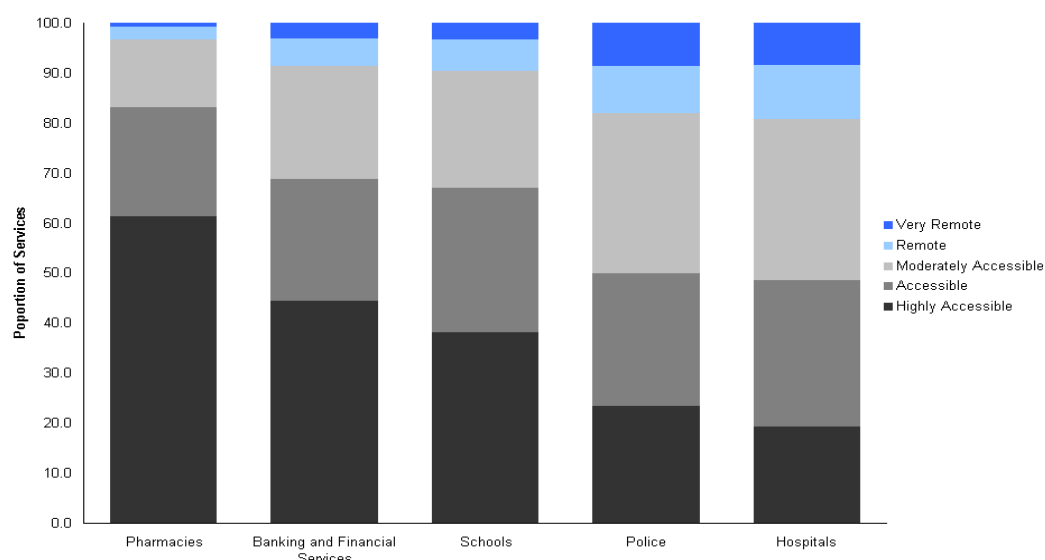


Figure 5.4: Proportion of points of presence in each ARIA+ remoteness category for selected services

Source: GISCA 2002

5.4 The importance of the motor vehicle

Remote communities rely heavily upon existing transport resources and services, and therefore consume them quickly. The average car in a remote Aboriginal community has an extremely short lifespan, not exceeding two and a half years on average.

Nonetheless cars have become ingrained into the way of life in remote Aboriginal communities. As an example, Edwards (1992, 2004) has described how this process evolved in the Pitjantjatjara lands in the northwest of South Australia. Today the motor vehicle is ubiquitous, although its influences are many and varied. For instance, the word ‘truck’ can evoke expressions of autonomy, notions of collectivity, intercultural frustration and even seemingly random acts of extreme violence (Stotz 2001). In remote regions of the Northern Territory there is seemingly no use the car cannot be put to:

People use the car primarily for hunting, shopping, ceremonial travel, visiting family in hospital and jail. The car is a sign of prestige and privilege. The car is also a mobile home and private bedroom; blankets and mattress are stored on seats, doubling as seat covers. Often a gun is placed under the front seats and game is shot from the side window (Stotz 2001).

There is much evidence to suggest that cars in Aboriginal communities are heavily used and highly valued.

Equally the motor vehicle allows Aboriginal populations to maintain their culture. Settlements are very spread out in remote regions and travel between them is very important for business and social reasons. The tyranny of distance is sharply felt in remote areas.

Coupled with this is the fact that outstation life deals in distances only navigable by motorised transport, thus creating an Aboriginal dependence upon motor transport – and like in so many other cultures and scenarios, the car provides a means of freedom or escape.

5.4.1 Vehicle access

The most recent available data, the ABS 2002 NATSISS, indicated that only 47.5 per cent of Aboriginal people in remote populations have access to a motor vehicle to drive. However, anthropological research suggests that the ABS data drastically inflates real access in remote regions, writing ‘These figures all suggest approximately 5–10 per cent of the Aboriginal population having access to a vehicle ‘to drive’ at any given time’ (Holcombe 2006). Whatever the real figure may be, it can be seen that access to vehicles is of great concern to Aboriginal populations compared to access rates of non-Aboriginal peoples. This is also a concern in non-remote regions, where Aboriginal people also have lower transport access rates than non-Aboriginal people.

The NATSISS data also show that Aboriginal females have lower access rates to vehicles than males, while Gerrard notes in some communities ‘access to Aboriginal-owned vehicles was strictly limited by clan and family affiliation’ (Gerrard 1989 in Holcombe 2006).

A further dilemma facing Aboriginal communities in remote areas is in regards to the use of ‘community’ vehicles. After public criticism in the 1990s about government expenditure on vehicles for remote communities, many vehicles purchased for these communities are today provided subject to specific conditions (Holcombe 2006).

From this develops large networks of car sharing, lift taking and lift providing that create great strains on communities and car owners. Due to low car ownership levels and limited transport access, great pressure is placed upon existing services and on those who do have cars. This problem has persisted for some time. For instance, Travers Morgan (1988) noted this in Alice Springs: ‘This pressure to provide transport was said to contribute to inefficient use of staff time and resources and is a source of continual conflict, particularly when drivers refuse to carry the passenger(s). However, it is often difficult for drivers to refuse, knowing that a taxi is the only other alternative’.

5.4.2 Vehicle cost

A further constraint on vehicle access for Aboriginal communities is their cost.

Aboriginal communities, especially in remote regions have been found to spend a greater proportion of their income on car-related costs. Lawrence (1991) noted some of the reasons for this:

Aboriginal people have a greater reliance on non-public transport, live for the most part in far remoter regions and consequently consume larger amounts of fuel. These added costs significantly affect both individual and community financial assets. Furthermore, sheer distance and the condition of unmaintained roads exact a further toll on vehicle expenditure. Personal and commercial vehicles require more fuel because of distance and subsequently require more maintenance due to rough road conditions.

Crough and Pritchard (1991) noted that Aboriginal people were inequitably charged for motor vehicle taxes, especially given that the majority of such government taxes and charges are in fuel excise and taxes levied on petrol. They suggested that in an area of central Australia, of whom the population was overwhelmingly Aboriginal, each resident contributed an average of \$151 per person per year to governments in the form of petrol taxation. This represented a significant burden in relative terms given their low income levels. It is unlikely that this inequity has been removed in the intervening years, and may define a specific research topic for investigation.

5.4.3 Automobility and wellbeing

Aboriginal mobility and vehicle use in central Australia are distinct from non-Aboriginal patterns, and while access to motorised transport has facilitated the elaboration and extended reach of certain Aboriginal activities, it may not have facilitated enhanced wellbeing. Pleshet (2006) suggests that there is an exceptionally high quantity of unregistered cars, and people per vehicle, in the regions around Alice Springs:

Extensive automobility that relies on unsafe vehicles, and unsafe use patterns results in high rates of traffic-related infringements and fatalities throughout central Australia. These conditions directly affect the capacity of Aboriginal people to continue living in dispersed desert settlements. It seems clear that desert settlement viability is unlikely to be sustained without interventions which improve Aboriginal access to transport, and which generate opportunities to be involved as employees and producers in transport services.

Another major disadvantage faced by remote settlement vehicle users can be seen in the injury and death rates from land transport accidents in central Australia. The overall death rate from land transport accidents is the highest for any accident category. The Aboriginal rate of land transport-related accident deaths is approximately four times the non-Aboriginal rate (Mitchell et al. 2005).

In addition, the road safety situation for remote settlement vehicle users compounds the cost of transport. As stated by Pleshet (2006):

The significant costs of the existing central Australian transport geography do not derive only from direct costs associated with unaffordable vehicle maintenance, or even the rising costs of fuel. Insurance for potential accidents is also a significant issue.

The increasing social burden which arises from desert automobility ought to be seen both in terms of input costs, and in terms of opportunities forgone in the transport process. These costs, both direct and indirect, accrue to desert regions as a whole, but most particularly to Aboriginal settlement residents. This raises questions about the relationship between human population mobility and human wellbeing.

On the one hand there is a growing body of evidence suggesting that the use of vehicles for cultural purposes, including ‘business’ and getting out ‘on country’ to collect food, can have strong and measurable health and wellbeing impacts (Pawu-Kurlpurlurnu et al. 2008). On the other hand, automobility that relies on the use of unsafe motor vehicles, in unsafe ways, can result in significant problems of traffic-related infringements, personal injuries and fatalities (Pleshet 2006). Ownership and operation of motor vehicles imposes significant costs on individuals. The overall relationship between greatly mobility and wellbeing is not necessarily positive. There is a dilemma, the resolution of which needs support through future research, to enhance the positive aspects and minimise the harmful possibilities.

The implication of this dilemma is that while immobility through total lack of transport creates genuine difficulties in sustaining health and wellbeing, extensive and continuous *travel* is not of itself necessarily welfare-enhancing.

The situation might be described as follows for desert settlement economies: at one end of the scale, involuntary immobility restricts access to opportunities for desert communities, especially in mainstream labour markets and places of education. At the other end of the scale, extensive

discretionary mobility has the same effect, as people find it equally hard to be in the right place at the right time. Extensive mobility may also require significant resources to be consumed in movement process, resulting in substantial resource ‘leakages’ from remote settlement economies. However, there may also be a mobility optimum, which is consistent with the viability of remote settlements. Arguably this optimum cannot be achieved in a dysfunctional transport system. A transport system that relies on low quality vehicles, used intensively over poor roads, is vulnerable; as then are the settlements which rely on it (Pleshet 2006).

5.5 Culture

5.5.1 Importance of culture

An issue of great importance in regards to Aboriginal transport disadvantage is the provision of culturally appropriate transport services.

Connection to homelands and extended kinship networks is a vital aspect of Aboriginal life and access to transport is a key to maintaining this connection. Participation and attendance at events and homelands is at a high level for Aboriginal peoples living in both remote and non-remote regions (Currie & Senbergs 2007).

Cultural obligations are often given priority over work and education commitments by Aboriginal peoples. These cultural commitments are mobility dependent; they can only be conducted if the cultural venue can be reached (Currie & Senbergs 2007). The effect of cultural commitments Aboriginal populations means their ‘travel priorities do not fit neatly into a mainstream transport system, as they are multifaceted and link urban and rural locations’ (Pollack 2001). Pollack concludes by saying that ‘government agencies and policy makers must consider this area of transport disadvantage so that restricted access to mobility is not a barrier to cultural survival for Aboriginal people living in an urban environment’. The question is then how to provide appropriate and viable mobility options for Aboriginal people. This is an important research question, for which some previous research (e.g. Pleshet 2006 and Pawu-Kurlpurlurnu et al. 2008) has made initial contributions, but there is much more to do.

5.2.2 Cultural barriers

The cultural distinctiveness of Australia’s Aboriginal populations highlights the need for culturally appropriate services (e.g. see Currie & Senbergs 2007, Pawu-Kurlpurlurnu et al. 2008) to be provided or catered for in Aboriginal communities. Services are required for transport over long distances, and bus services may be unsuited to many Aboriginal groups since they often needed door-to-door travel. These concerns regarding culturally appropriate services for Aboriginal populations are both important and sensitive. The transport study by BAH (1998) identified five basic needs of the Aboriginal community (Table 5.3).

Table 5.3: Strategy measures to address Aboriginal transport needs

Need	Bus services	Taxi	Minibus	Community transport
Prefer door to door travel	Set and enforce route coverage standards Examine door to door public transport	Maintain door to door services	Maintain door to door services	
Need group travel including children	Consider group travel ticketing	Encourage group travel in taxis	Encourage appropriate group travel in minibuses	Encourage better use of community vehicles
Need for low fares	Maintain fare concessions Ensure targeted subsidies Coordinate subsidies with Aboriginal service providers	Coordinate subsidies with Aboriginal service providers Assure reasonable group fare rates	Coordinate subsidies with Aboriginal service providers Assure reasonable group fare rates	Maintain no fares principle
Don't understand transport, how to use or what the rules area	Provide an education officer for all modes to communicate ideas	Provide an education officer for all modes to communicate ideas	Provide an education officer for all modes to communicate ideas	Provide an education officer for all modes to communicate ideas
Need demand responsive not scheduled services	Encourage use of non-scheduled services Examine responsive, door to door public transport			

Source: BAH 1998 in Currie and Senbergs 2007

Aboriginal communities do not necessarily require the same types of services as non-Aboriginal people. Currie and Senbergs (2007) discuss why the transport needs of a target population need to be understood before undertaking the design of a transport service for them. Without that understanding the service may be rendered ineffective and inefficient.

6. Aboriginal population mobility

How can Aboriginal population mobility be identified? A first step in this process is to consider lifestyle, culture and population dynamics. Prout (2007) states that:

A number of aspects of Aboriginal population mobility continue to be rendered 'invisible' within standard statistical measures. Yet these statistically un-captured mobility processes are often integral to Aboriginal lived experiences and have a significant dialectical relationship to government service delivery processes. Understanding these population dynamics is therefore a critical, though underdeveloped, consideration in contemporary debates about federal Aboriginal policy.

In addition to these considerations, it is also important to understand the institutional and organisational influences on population mobility.

6.1 The literature on Aboriginal mobility in Australia

The literature on Aboriginal mobility can be grouped into two broad categories:

1. Firstly there is a body of literature dominated by the discipline of anthropology that is concerned with qualitative analysis or what might be described as the socioeconomic role of Aboriginal mobility and its cultural context. This body of literature generally sources information using ethnographic techniques.
2. The second category of literature is concerned primarily with migration demographics, this body of literature uses ABS Census data as a primary source for analysis and it seeks to compare Aboriginal and non-Aboriginal mobility patterns.

6.2 Case studies

Recent attempts by demographers to analyse Aboriginal mobility have been curtailed due to the reliance on ABS census data which may be of limited analytic usefulness for remote Aboriginal Australia. There is a need for finer-grained quantitative data as well as qualitative information concerning Aboriginal mobility in order to shape programs, services and policies.

In general, demographers tend to equate mobility with a change in the individual's place of residence. Memmott et al. (2006) sought to quantify Aboriginal mobility using case study findings. Although the case studies (Mt Isa, Dajarra in Queensland, and Alpuururulam in Northern Territory) investigated this aspect of mobility, they also attempted to gain a broader understanding of Aboriginal mobility. The projects consider various spatial (intra-settlement, intra-regional, inter-regional) and temporal (short-term, long-term) scales of mobility that involve a range of settlement types. The studies determine the extent of such movements and any causal factors that underlie them. The goal was to focus on the smaller intervals of time and space that have not been empirically addressed in the literature.

6.2.1 Methods

Memmott et al. (2006) selected the regional centre of Mt Isa and its surrounds because of the importance of that city in providing services for Aboriginal people in both Queensland and the Northern Territory. They selected the settlements at Dajarra (Queensland) (estimated Aboriginal

population of 190 in 2001), and Alpururulam (Northern Territory), estimated Aboriginal population of 355. The study region is shown in Figure 6.1.

The field survey was used to gain both qualitative and quantitative data on Aboriginal mobility. In particular, information was sought on two aspects of mobility: (1) the movements of community residents travelling to regional centres, and (2) the perspectives of Aboriginal people in regional centres who receive visitors from outlying communities. As discussed by Memmott et al. (2006), the field study provided a qualitative understanding of flows and shifts between the two remote settlements and urban centres.

6.2.2 Findings

Memmott et al. (2006) found that their study participants were highly mobile in their day-to-day lives over the previous year. There was a trend for people to travel and visit one or more places for short periods of time and then return to their home community, which is a form of circulation.

While the people were mobile, they were moving around within a defined cultural or mobility region, so that their mobility was largely localised. There were relatively low levels of migration observed in the study, and little change in the usual place of residence of study participants.

The findings of Memmott et al. (2006) substantially support earlier findings in the Aboriginal mobility literature (Young and Dohan 1989, Hamilton 1987). Kinship is consistently seen as the great driving force of Aboriginal mobility. Kinship is maintained through mobility; it makes mobility possible; and it contributes significantly to the definition of mobility regions. Some other important categories of motivators for travel were identified by the survey participants. These were travel for sporting events and recreation, travel for hunting and bush resources, and travel for shopping. Other motivators, but of lesser importance, were employment participation, visiting traditional country and obtaining health related services.

A major conclusion by Memmott et al. (2006) was that there is a need for substantial further research to refine the presently available tools for data collection and analysis so that they can properly model circular movement and simultaneously capture variations in the timing, duration, and frequency of travel for different Aboriginal mobility regions, as well as capture the spatial patterns involved.

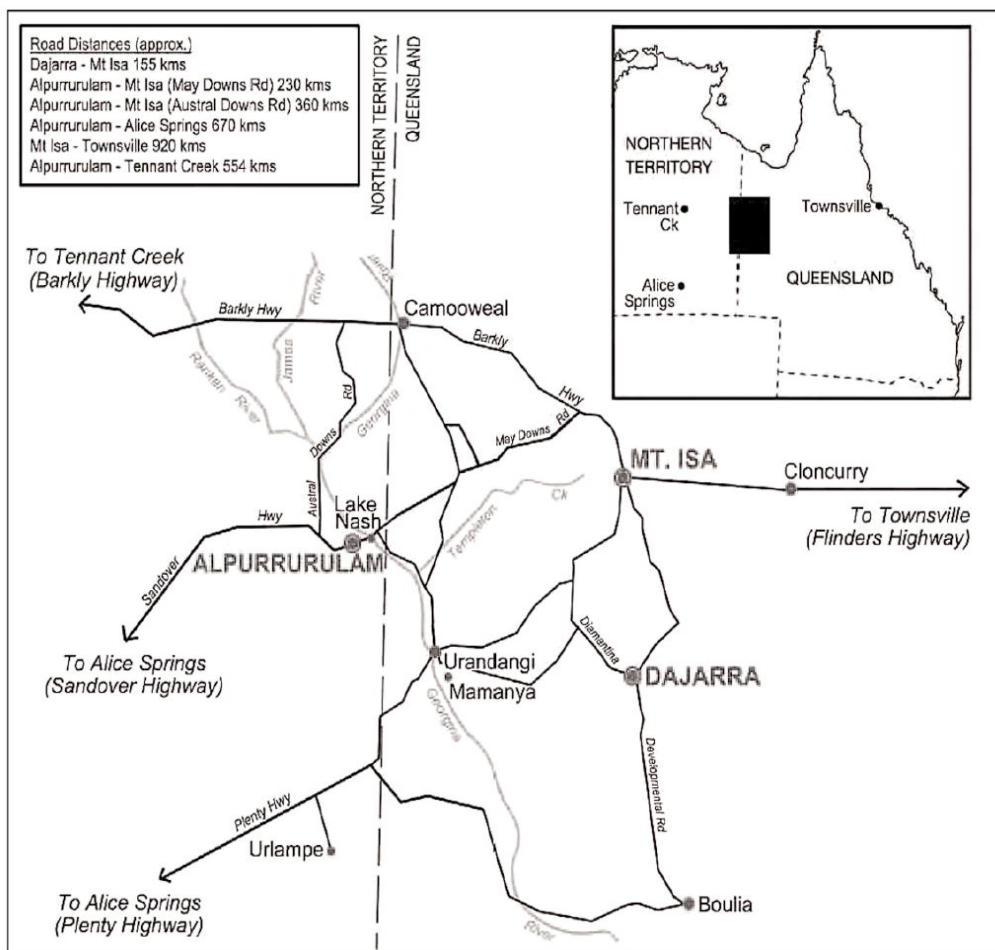


Figure 6.1: The region studied by Memmott et al. 2006

6.2.3 Policy implications

The Memmott et al. (2006) study is important in a policy context because it highlights the need for policy development on the basis of localised movements within a region and the strong relationship between regional centres and outlying communities.

Ten areas of highly relevant service provision for Aboriginal people emerged in the study. These areas are further intertwined with the pattern of mobility. They are:

- recreation and sports
- shopping and store services
- employment, training and social security
- visiting traditional country
- health services
- education services
- police, court and correctional services
- housing and accommodation services
- aged care and funerals, and
- transport and road services.

6.2.4 Centralisation

The balance between centralised and decentralised services needs to be assessed carefully. While some services (such as the law courts) will only be viable if they are operated from a regional centre there are other services, or their elements (such as law enforcement), that need to be decentralised, or that will be most effective if they remain decentralised. Thus policy must find and maintain an optimal balance between meeting the service requirements of outlying communities locally and rationalising the appropriate aspects of service provision in the regional centre.

6.2.5 Aboriginal mobility patterns

Long and Memmott (2007) and Memmott et al. (2006) have provided useful insights into patterns of Aboriginal mobility and the factors that influence this. Their research may be seen as identifying four main factors for consideration:

- the distinction between temporary stays and long term migration
- temporal influences on mobility
- different motivations for travel and movement, and
- the spatial region of mobility.

Temporary visitation versus migration

Long and Memmott (2007) identified two forms of mobility behaviour: (1) regular circulation within the mobility region over short periods of time (also termed ‘temporary visitation’), and (2) longer term migration (persisting for a generation or more). They found that the lives of Aboriginal people in rural and remote Australia tended to be characterised by inter- and intra-community mobility, including circular movements within a given ‘mobility region’, and high rates of travel to places (including regional centres) within that region for relatively short periods of time.

Temporal influences over mobility

The pattern of mobility is associated with a calendar of annual Aboriginal social, economic and regional events. Mobility patterns are also influenced by the timing of work, school and holidays, and by seasonal climatic events. Seasonal events determine the availability of bush resources and thus movement of people to hunt and collect bush foods; seasonal rain prohibits or restricts mobility.

Motivators for travel

As indicated previously, kinship is the great driving force of Aboriginal mobility. It constitutes the most common reason given for travel and contributes to the definition of mobility regions. Even for the other travel motivators (such as sporting events and recreation, hunting and bush resources, shopping, employment, visiting traditional country and health services), visits to kinfolk may be included in the process, for hospitality and (if required) economic support then readily provided. Memmott et al. (2006) suggested that most visits were of reasonably short duration (modal frequency about three days, with most visits of less than one month duration). Consequently household and community resources need to be geared to serving ‘overnight’ populations that may be well in excess of the apparent permanent resident population of a community. Memmott et al. (2006) also found that in the larger (regional) centres, where visits were also made for purposes of accessing services, there

were potential needs to ensure the supply of adequate temporary accommodation, including hostels or perhaps community-owned housing.

The mobility region

Memmott et al. (2006) indicate that the mobility region for a given community may be difficult to define with precision. While there is an inner region of common movement including the regional centre, the variations in movement patterns of individual communities are dependent on their unique history of past migration and particular cultural and socio-economic linkages. Some of these linkages extend into surrounding regions. Where such centrifugal movements exist, it is difficult to clearly define an exterior boundary for the mobility region.

The question of long term or permanent migration from one region to another is a further consideration. Long and Memmott (2007) in their case studies from north-west Queensland and eastern Northern Territory found that most of the Aboriginal population in their study region (Figure 6.1) remained within the area where they were reared and where their traditional country is situated. They concluded that while people regularly move, their movements are for the most part confined to within this mobility region or cultural region.

6.2.6 Transport and road services

What then is the influence of the available transport networks and infrastructure on Aboriginal mobility in remote areas? Memmott, Long and Thompson (2006) provided a case study for the north-west region of Queensland, which provides some explicit insights. For instance, they found that the residents of Dajarra and Alpururulam communities made regular visits to Mt Isa as their regional service centre. Whereas Dajarra was linked to Mt Isa by bitumen road, Alpururulam was linked by roads that were partly or largely unsealed and poorly maintained. Alpururulam residents consequently faced problems of poor and unsafe road conditions that were significantly exacerbated by seasonal conditions, especially in the wet season. A related environmental health problem for the Alpururulam community occurred in the dry season, when dust from the Sandover Highway was blown into the community by passing traffic during southerly prevailing winds. It could thus be concluded that sealing of this section of road could be regarded as a health priority.

The high frequency of travel suggests that if desired services such as health care are not decentralised, Aboriginal people are likely to continue to travel to seek them. It is also likely that Aboriginal people will continue to travel frequently to sustain social relationships and relationships with country. Such high mobility has implications for the safety and economy of vehicular travel and the conditions of roads.

The condition of the road network in remote areas, especially those roads not part of the major national highway system, once more emerges as an issue of concern not just for transport and mobility but for other aspects of community and living.

6.3 Conclusions

The studies reported above suggest that Aboriginal people in remote and regional Australia are both highly mobile by Australian mainstream standards but largely stable in their attachments to their home community, country and their cultural region. Government policy may have little impact in this regard. Aboriginal people continue to travel because they need to participate in activities such as employment,

shopping, education, health services and sporting events – as do mainstream Australians. The difference is that the travel by Aboriginal people, by virtue of location, may take place over considerably longer distances and occupy more time than would travel for similar engagements in the major urban centres. The resource and infrastructure needs to support Aboriginal mobility are thus different.

For the residential mobility of Aboriginal people then, there is a need to conceptualise the community to which they belong, as discussed in Long and Memmott (2007), in terms of a regional network of kin and settlement centres, in which individuals are constantly mobile. This is the reality in which to shape government policy, service delivery and economic development opportunity. Therein lies the challenge for service provision and access. There is a need to maintain a balance between meeting service demands locally, especially for outlying communities, and providing sustained access to centralised services. Further, service delivery must be done in ways that reflect the desires of Aboriginal people to sustain social relationships and relationships with country (Memmott et al. 2006, Long & Memmott 2007).

Central to this challenge is the provision of a safe and accessible all-weather road network; then comes the consideration of how remote area residents, especially Aboriginal people, can use this network.

7. Public transport for remote communities

A study by BAH (2004) looked at assessing the need for land based public transport services for remote communities in the Alice Springs Region.

7.1 Transport need

The specific issue addressed in the study was the demand for transport from Alice Springs back to surrounding communities (which comprised 32 separate remote communities, with an aggregate population exceeding 10,000 people).

Figure 7.1 shows the main settlements and gives a diagrammatic layout of the road network.

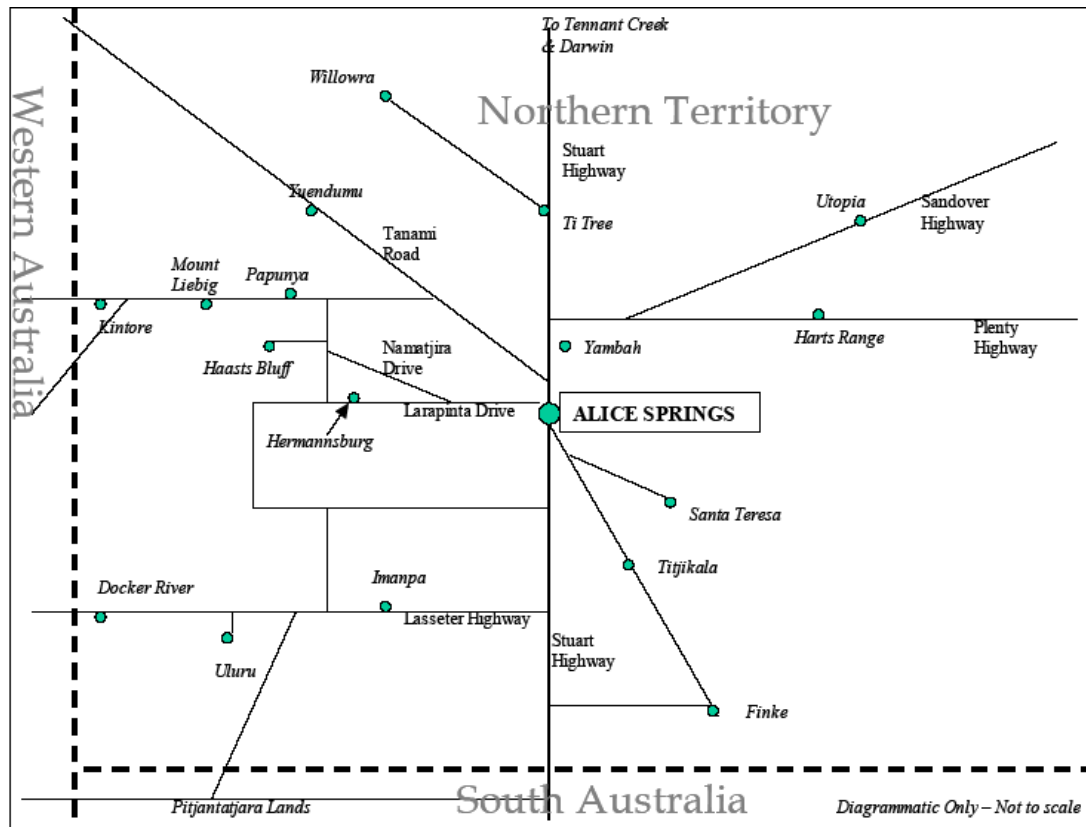


Figure 7.1: Principal remote communities – Alice Springs region

Source: BAH 2004

Transport from Alice Springs clearly is an issue as indicated by the responses from most of the people contacted.

7.1.1 Why people become stranded in Alice Springs

As the regional centre for a widely dispersed area, Alice Springs provides the shopping, banking, medical, Government facilities and entertainment for up to 10,000 people living in remote communities. The main journey purposes identified and reasons for people being unable to return home are:

1. medical appointments
2. football matches and other events
3. private cars confiscated
4. short of funds for return fare
5. prison releases.

There may be other factors to consider but BAH (2004) suggested that these factors alone indicate that at least as 200 people per week may become stranded in Alice Springs. Further, the length of their stay in the town waiting for return transport will impact on the numbers of people awaiting transport home at any one time.

7.1.2 Travel to and from Alice Springs

Estimates from the communities suggest that 5–10 per cent of their population could in fact be in Alice Springs at any one time, and *potentially* looking for transport back home (BAH 2004). One

significant means of transport is understood to be car sharing. Figure 7.2 shows the AADT (Annual Average Daily Traffic) volumes at various locations on the road network, thus providing a measure of the volume of car travel undertaken.

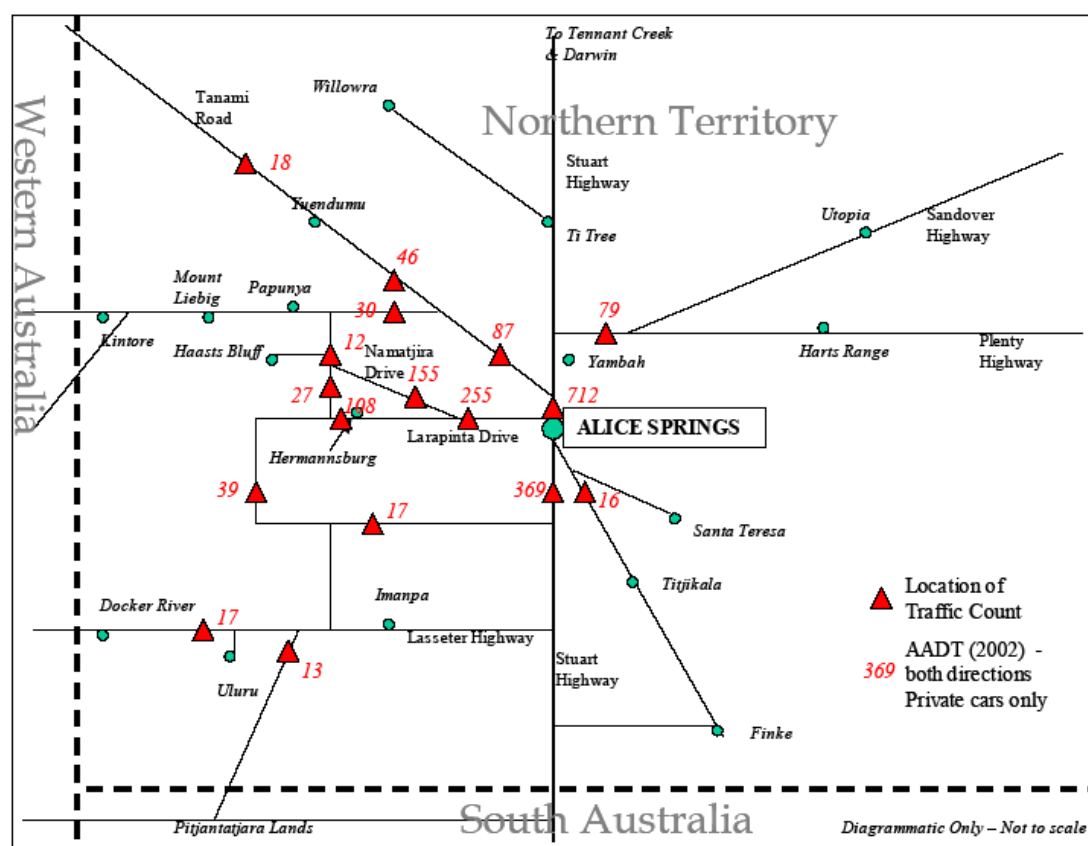


Figure 7.2: AADT private car volumes (2002) – Alice Springs region

Source: BAH 2004

These calculations suggest that the community estimates of 5–10 per cent of the population being in Alice Springs looking for transport home may well be overestimated if it is assumed that private car is still the dominant travel mode.

7.1.3 Arrangements in Alice Springs

While in Alice Springs, people tend to stay in Town Camps for their own communities or with relatives living permanently in the town. The town camps provide a good location to find people wanting to travel back and informal car sharing arrangements can be easily established. (Centre Bush Bus operates via the town camps to pick up travellers before leaving Alice Springs on the outbound journeys.) However, when the money runs out and people cannot return home they often outstay their welcome with friends and relatives in Alice Springs. This situation can lead to anti-social behaviour and other problems associated with the people from remote communities stranded in Alice Springs (Foster et al. 2005).

7.2 Services provided

7.2.1 Air, bus and rail services

There are options for ‘return to community’ transport for the people involved:

1. Air services are expensive but operate at least weekly to most communities
2. Centre Bush Bus services operate north on the Stuart Highway to Tennant Creek (twice weekly) and also weekly via the Lasseter Highway as far as Docker River on the Western Australian border
3. McCafferty’s operate daily coach services on the Stuart Highway and also to Uluru. The northbound coach, leaving in the late afternoon, is not particularly well timed for travel to remote communities
4. Some communities operate a community bus into town on an ad hoc basis but often in connection with football matches or other events
5. A group of people for the same destination might be able to hire a Blue Top minibus for the trip
6. The Ghan rail service operates weekly north of Alice Springs and twice weekly south of the town. However, timings and station locations mean this service is not particularly useful for most remote communities.

Tangentyere Council provides a ‘Return to Community’ scheme to assist people in severe hardship to return home. This scheme costs \$200 000 per year for just over 2000 people assisted. The council assists with bus fares (where services are available) and petrol costs. They also provide wardens to escort some people home.

7.2.2 Communities without land transport access

The above services provide only limited coverage. No regular scheduled road based public transport is available to 22 of the 32 (69 per cent) identified communities with a combined population of over 7000 (around 70 per cent of the regional population). Most of these communities receive air services, but many Aboriginal people do not like air travel and air fares are considerably higher than bus and coach fares.

The lack of transport gives rise to other issues, not just the number of people stranded in Alice Springs for want of transport home. The Education Department and the Quality of Life Project both identified the lack of transport preventing access to public schools for students wanting to progress to Year 12. Although private schools convey children to and from Alice Springs at the beginning and end of each term (and also for mid-term weekends), no facility exists for children dependent on public education.

In the absence of a public transport option for travel home, some people who arrived by car and then had the vehicle impounded as unroadworthy may resort to stealing a vehicle in Alice Springs for the return to community. If communities seek to use their own bus for this travel, the vehicle may be off site for some considerable time so the community is deprived of a local transport resource during this time. A round trip from Docker River, for example, is likely to take two days.

7.3 Potential transport options

The absence of regular road based transport to most communities is a major factor in trying to determine what transport options are available. Since most of the travel is actually generated from the community end and most of the transport resources (apart from the community buses) are based in

Alice Springs, transport operators need to overcome the hurdle of having an agent in the communities to collect fares and make bookings.

More frequent services would address this, but the demand for travel on any given route is unlikely to justify higher frequencies.

The option of switching from air to bus for the carriage of mail has been suggested as a way to support a more frequent bus service (or, for that matter, any bus service at all). There may be security issues with this option, but it is successfully applied elsewhere.

Sweeper buses operating on Sunday afternoons and picking up passengers for the main communities might attract some custom by capturing the post football travellers, but there would be an issue of funding these services. They might also undermine the viability of the other services operated for these communities, especially if subsidy is paid to the operators of the sweeper buses.

A change to the bus fare structure to encourage passengers to buy a return ticket on the inbound trip to Alice Springs might reduce the incidence of people not having the fare to return home.

Another option might be to develop 'transport vouchers'. These would be exchangeable for any form of transport but not for cash. They could be provided to people who are going to travel but would prevent them spending their value on non-transport items.

Encouraging car sharing by officially recognising points where people wanting to travel in a particular direction can wait for a car heading that way might also help. A system currently operates informally on the Larapinta Drive from BJ's shop about two kilometres from Alice Springs.

The options indicated above may be summarised as follows:

- encouraging the development of more regular bus services to the larger communities
- transferring mail from air to road delivery and carrying passengers and mail on the same vehicle. An option for increasing 'outreach' services i.e. bringing services to communities through mobile vans could be a part of such a scheme
- the development of sweeper buses operated after major events to take people back to communities. This could be coordinated with formalised departure points and times at major event sites
- encouraging operators to apply a fare structure which promotes the purchase of return tickets
- developing a 'Transport Voucher' system for the Northern Territory
- formalising and greater encouragement of informal car sharing arrangements
- improved Driver Education for remote communities.

These options are not mutually exclusive and related issues, especially funding issues, need to be considered along with the impact of the proposals on existing transport operations. The analysis would also need to take into account the impact of travel needs other than the 'Return to Community', for example, improved access to educational facilities in Alice Springs (BAH 2004).

7.3.1 Development of a Business Case

Extensive consultation was undertaken and established that the scale of transport access need was indeed significant.

Over 10 000 people living in remote communities look to Alice Springs as their Regional Centre for a range of activities. 70 per cent of this population have no regular scheduled bus service.

It is estimated that up to 200 people per week may become stranded in Alice Springs for lack of transport home.

A number of communities with populations in excess of 500 people have no regular bus connection with Alice Springs (Figure 7.3).

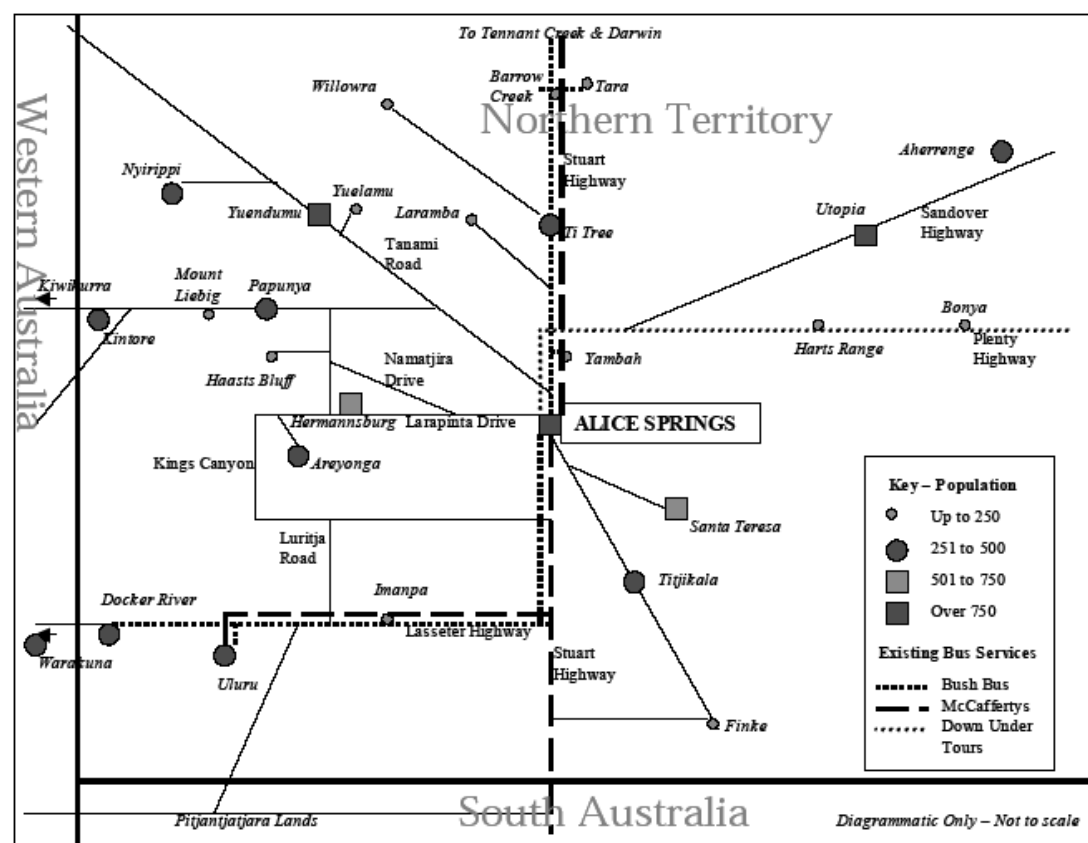


Figure 7.3: Existing bus services to remote communities – Alice Springs Region

Source: BAH 2004

Three options were adopted for the development of a Business Case for services to address the access issues:

- encouraging the development of more regular bus services to the larger communities.
- encouraging operators to apply a fare structure which promotes the purchase of return tickets.
- developing a 'Transport Voucher' system for the Northern Territory

At least two of the four corridors assessed for the Business Case could then be considered for development as a pilot study:

- the Yuendumu and Walungurru corridors show positive financial and transport benefits to the communities served. In addition, the Sandover/Plenty may prove beneficial with more detailed consideration of the demands and funding options.
- to develop these services the following issues need to be addressed:

- community travel demands – established by consultation with the appropriate community representatives.
- the provision of a local booking agent
- funding
- bus operator selection

BAH 2004.

7.3.2 Example of South Australia

South Australia is developing packages of services based on different areas within the state. In each area, access is addressed from a community perspective and focuses on transport needs for all agencies and residents in the communities involved. This leads to an integrated approach to meeting as many local transport needs as possible.

A plan was considered which would involve a twice weekly service from Port Augusta to Alice Springs via the Pitjantjatjara Lands (immediately south of the Northern Territory south-western border). This would address a number of specific transport issues:

- access for residents of remote communities.
- health transport needs.
- high price tourism connected to the Women's Art Movement. The service would carry limited numbers of tourists into the Aboriginal lands. To improve the service to the tourist market the bus may also operate via Uluru.
- health staff transport into and out of the area.
- perishable foods & medical supplies.

BAH 2004

7.4 Conclusion

According to BAH (2004), there are a number of settlements in the Alice Springs region with a population greater than 500 which lack a scheduled bus link. Further, some 70 per cent of the regional remote settlement population which relies on Alice Springs has no scheduled transport services. BAH (2004) identified a range of potential service 'corridors', and estimated passenger numbers for each, as well as the service frequency deemed feasible given the estimates of passenger movements.

Pleshet (2006) noted that two key points can be taken from the BAH (2004) study. Firstly, that scheduled fee-for-service transport is a feasible way to address the current inadequacies and vulnerabilities of the central Australian regional transport system. Secondly, that a cost-benefit framework which does not extend to assessing the opportunities forgone under the current system – with its high rate of unregistered vehicles, traffic offences, and traffic fatalities – does not go far enough. At present, those remote residents who currently organise their own transport cannot be viewed as a 'cost neutral' population for planning purposes. In fact, the failings of the regional transport system affect them in ways that require significant public spending on health, and crime and justice expenses.

Affordable community or public transport systems for essential mobility and access for remote communities to regional centres (such as Alice Springs) are now a necessity. The imperative to provide such services will only grow as the increased complexity of modern vehicle technology and fuel price rises continue to undermine the overall affordability of privately owned transport for those in remote communities.

The problem is compounded because it is not just the scarcity of transport supply in remote desert areas of itself that is of concern. As argued by Pleshet (2006), the consequences of transport scarcity include the widespread use of transport that is unsafe or illegal, or possibly both.

8. Consultation with stakeholders

A wide ranging process of consultation with stakeholders was undertaken in the scoping study. This process included interviews and discussion with representatives of government departments and agencies, private companies, and academia, as well as an intensive workshop in which many of the research needs were debated.

The following discussion summarises the outcomes of the consultations.

8.1 Government departments and agencies

8.1.1 South Australia

In South Australia, the Department for Transport, Energy and Infrastructure (DTEI) is responsible for managing the state's road network, including the roads in remote, desert areas. The remote area road network services local people, tourists and mining companies. With the exception of the highways in the National Land Transport road network (i.e. the Eyre Highway and the Stuart Highway), almost all of the network is comprised of unsealed roads. DTEI maintains and grades the roads in the remote areas of South Australia. For example, its Port Augusta Transport Services Division employs more than 40 staff who patrol the road network, and has the capacity to re-sheet about 600 km of road per worker per annum. This division is responsible for the road network in areas to the north and to the west of Port Augusta, which covers most of South Australia and all of its remote areas. There has been a high frequency of grading in recent years, reflecting the growing importance of maintaining good connectivity and accessibility across the network. In addition, there is an Aboriginal Lands Road Manager in the Port Augusta Division, whose responsibilities include keeping in contact with Aboriginal communities. This manager is currently conducting a project for the installation of road signs in the Aboriginal areas (the APY – Anangu Pitjantjatjara Yankunytjatjara – Lands). This project is making strong use of local people for its labour force.

The major issue concerning DTEI is the condition of the existing road network. Unsealed roads can deteriorate quickly and degenerate into poor quality and sometimes dangerous road surfaces, thus the continual need for grading. The only way to overcome this perpetual problem is by sealing the roads, but this is most expensive, if not of prohibitive cost in remote areas. The SA Government is attempting to address this problem but there are still more than 10 000 km of unsealed roads in SA. The current cost estimate for sealing a two-lane road is about \$300 000 per km, with this cost inflated by the difficulties in obtaining suitable road making materials and transporting them to the site, and the cost of local water supply. The cost of then sealing the 400 km of road into the APY lands would then be \$120 million. Road maintenance and construction costs are funded by the state and federal

governments. Significant road development depends largely on the availability of funding, with the mining industry able to provide this – but only of course for road developments related to mining projects.

The SA Government has also been investing significant funds in housing for Aboriginal communities in the remote areas, but to date has not been able to provide funding for road construction and improvements in the Aboriginal areas. This situation will need to be reviewed in the near future due to concerns such as those about road safety.

Each Aboriginal community has a Multi-Service Outlet which is funded by the government and provides dialogue between the government and the local people. Some communities have a mini TAFE facility or a small school. Given the scarcity of jobs in the region, employment remains a problem. DTEI sees that there is an opportunity to offer Aboriginal people labouring work in road maintenance, and the recent project on installing road signs in the region has indicated that this could be successful.

8.1.2 Western Australia

Main Roads WA (MRWA) is responsible for the main road network in Western Australia. The agency is directly responsible for interstate and state highways, and works with local government to maintain local main roads. Most of the funding for roads in the remote areas is provided by the federal government and administered by MRWA. The authority has been considering construction of an all-weather road from Kalgoorlie to Alice Springs, along with the South Australia and the Northern Territory Governments. However, the opportunity for this road development appears to be slight, because of a lack of funds and difficulties in obtaining the full cooperation of each jurisdiction.

Cost is the main problem in building new roads or upgrading existing ones in remote areas, and investment requires viable results from cost-benefit analysis. Without satisfactory results from such analysis, projects cannot be justified. This means that the actual level of traffic demand must drive the development of new road projects.

The mining industry has provided a major boost to new road projects, and without this industry there would be restricted opportunities in the remote areas. At the same time, traffic conflicts between mining vehicle traffic and other road users may also emerge as a major issue.

Tourism is likely to be the second main reason, behind mining, for road upgrades. For example, there is a vision to see a high quality road from Perth to Alice Springs, but it will take a long time to realise. Portions of the road have been reconstructed and sealed, as only individual sections can be justified, the road is upgraded incrementally according to the tourist demand. For instance, the Cape Leveque road access project provides a good case for funding, because the local Aboriginal culture and the dramatic landscape make the area attractive to tourists. Thus the WA Government is prepared to invest money in sealing the road from Cape Leveque airport to Lombadina Aboriginal Community.

Information on road condition and incidents and crashes is provided by the police and by local government. Urgent and routine road maintenance plans are based on these reports. Typically, the Aboriginal communities provide the most reliable sources of information on the condition of sub-roads in outback areas. MRWA is spending about \$2 million a year on maintenance of sub-roads in outback areas. It recognises the needs for upgrading and sealing the remote area road network for the long-term economic development of the remote regions.

8.1.3 Northern Territory

In the Northern Territory, the state of the road network off the major highways was of major concern, with the need for road sealing being highlighted. Other concerns included road safety relating to Aboriginal people, including non-licensed driving, overloaded vehicles (too many people on board) and poor standard of vehicles. The major concern, however, was that some public transport or community or transport services be provided for people who became stranded in regional centres such as Alice Springs and had no way to return to their communities. This was also recognised as a major problem by representatives of the Northern Territory Department of Justice. Community transport and regional public transport services for outlying settlements was a potential solution, but finding suitable operators who could provide long-term services was the issue.

8.2 Academia

Academics from Curtin University of Technology and the University of South Australia participated in our discussions and the workshop. A number of pertinent issues emerged. While these tended to support the issues raised in discussions with public authorities, there were some different perspectives available.

The difficulty of providing good transport accessibility in remote areas was a major concern. The road network has to provide most of the access, especially for Aboriginal communities, but road conditions in desert areas are poor and often made worse by bad weather, especially rain. Four-wheel-drive vehicles were just about essential for visiting outlying communities. Air services were another option, but civil aviation services in remote areas, except perhaps for mining companies and high demand tourist locations, are not economically viable. Air services had operated from time to time for remote communities, but the example of the failure of Ngaanyatjarra Air was a good indication of the difficulties involved. These difficulties spilt over into the provision of medical services. Such services in remote areas are of necessity limited at the local level. While most communities would have a clinic and a nurse, many clinics do not have a doctor on site and have had to rely on fortnightly or monthly visits. Air transport for medical services has been supported by government, but has tended to be very expensive and did not really suit low income Aboriginal people.

Possible economic enterprises in outback areas included bush foods, herbal medicines, cattle and sheep grazing, and mining. These had the potential to generate good profits. However, it is difficult to help Aboriginal people start such businesses because of the underdeveloped infrastructure and support systems in the remotes areas. Transport insufficiency was one of the major problems contributing to this, but it was by no means the only problem. The closure of air services such as Ngaanyatjarra Air made business much harder to run.

Appropriate support and skills development opportunities are important for Aboriginal people. While some communities have schools or training centres that provide limited programs for skills development, there is no systematic identification of the skills required, nor development of appropriate programs.

8.3 Private enterprise

Most road transport services in desert areas are provided by private companies. Reliable road information services are vital, and new information technology is helping to achieve these. For instance, road information provision was being improved by the use of satellite communications

systems, which allow Aboriginal communities to regularly update road condition and accessibility information via the internet. Thus businesses are becoming able to have good information, relayed to them by local government agencies, which may be used by truck drivers, for instance, to avoid difficulties on the road. While the information available may still not always be sufficient or valid, there are now good developing information systems. This is an area for more investigation and system specification, as it has clear applications; for example, successful freight transport in desert areas needs quality information for advanced planning to avoid bad road conditions.

Transport conditions can be improved in two ways. One is the upgrading of roads by sealing the road pavements and improving geometric alignments, especially increasing radii of horizontal curves. The other way is by adopting vehicles and driver behaviours that will do less damage to existing road surfaces.

The closure of air services such as Ngaanyatjarra Air has not really been a problem for freight transport, because it is too expensive to use air transport for the freight needs of most desert businesses. Most freight in outback areas is carried by truck, and so improving freight services can only come from improving the road conditions. Better roads will also allow more frequent service, as vehicle trip travel times will be reduced.

There is a boom in tourist public transport services in desert areas, but these services are not suitable for the needs of local people. Regular pay-for-service bus schedules are difficult to implement and maintain. While freight vehicles could be considered as ancillary public transport, truck drivers are reluctant to provide lifts for people because of personal security concerns.

The rail system in outback areas is of limited coverage and use, mostly depending on the mining industry or the federal government. It is not suited to regional transport demands in remote areas.

Further issues that relate to transport services for remote communities include medical services, education opportunities and economic activity. Employment is a major problem for Aboriginal people in remote areas, for there are limited job opportunities.

8.4 Summary of stakeholder discussions

A number of common strands can be seen in the discussions. These may also be used to develop research needs. The main points of interest from the stakeholder discussions are:

1. the primary importance of the road network as the basic transport infrastructure in remote desert areas, and the problem of maintaining the serviceability of unsealed roads which are prone to degradation from episodes of adverse weather
2. the concomitant problem of the high cost of standard treatments – sealed road pavements – to remedy the problem of lack of serviceability, due to the high costs involved in road upgrading in remote areas, and the difficulty of achieving sufficient economic benefits to justify that expense, unless there is special cause, such as mining developments
3. at the same time, road maintenance activity can provide employment opportunities for Aboriginal people, thus providing additional benefits outside the transport arena
4. the provision of current and accurate road information services, which indicate locations of poor road conditions and road closures, is an invaluable planning aid for transport operators in remote areas. The gathering and use of local knowledge and information, relayed to road agencies via the internet and other modern communications media, can be invaluable and systems for the monitoring and provision of such information need to be researched

5. public transport services in remote areas need to be road based. Rail services do not provide sufficient spatial coverage and are too expensive for local use. The existing regional transport services tend to be tourist oriented and are not suitable for the needs of remote communities and their inhabitants. Other systems to meet these needs are required, which could stand to alleviate other social problems in regional centres caused as a result of people becoming stranded far from home
6. air services could provide good accessibility for remote communities, but are also dogged by high operational costs that make such services generally unviable, and
7. reliable and consistent freight transport is not well served. Road freight transport requires good roads and network connectivity. A number of the issues highlighted above, e.g. road information systems, need to be in place to improve both the efficiency and effectiveness of road freight transport in remote areas.

9. Conclusions and recommendations

The three aims identified in Chapter 2 of the report define the basic framework for a potential research program on improving the transport system in desert Australia. These aims are:

- the identification of structural impediments that limit regional transport in desert Australia and between regional centres and outlying communities
- consideration of the approaches available to achieve better local mobility
- the identification of significant research issues requiring further consideration.

It is possible to use the review and discussion in this report to consider alternative approaches to future regional transport provision and operations in desert Australia and to construct a set of research needs to support these approaches.

The major issue as found in this study is that of the fragile mobility available for Aboriginal communities and people. The available research suggests that Aboriginal people were highly mobile in their day-to-day lives, travelling to visit one or more places for short periods of time and then returning to their home communities. At the same time the level of mobility was largely localised, taking place within a specific cultural framework or regional area. Kinship provided the great driving force behind the mobility. Vulnerability of this mobility arises because of the reliance on the private car as the means of transport. The motor car is a great facilitator of travel over long distances, but in its absence people may be left with no alternative means to continue participation in accustomed mobility and the mainstream economy. Given that the vehicles used by Aboriginal people in desert Australia tend to be of advanced age, in poor condition, poorly maintained and perhaps used in unsafe ways (e.g. overloading in terms of numbers of vehicle occupants), breakdowns are common and the users may not be able to readily undertake repairs. Individuals and groups can then easily become stranded and without the necessary resources to take other transport alternatives.

This issue is further exacerbated by the poor condition of the road network, certainly at least the secondary road network, and the general absence of public transport services. Unsealed roads can present particular problems under adverse weather conditions, when traversing a road may become difficult if not impossible for significant periods of time (days, weeks and possibly months). Poor road surfaces lead to more wear and tear on vehicles. The lack of public transport links between population

centres obviously restricts the ability of people without cars to move around, and significantly reduces the alternatives available for car travellers if their vehicles are not working.

Overall, transport in remote areas such as those comprising much of desert Australia is relatively difficult because of the sparse road networks, long travel distances and poor condition of roads. Further, access to services and facilities, both public and private, is also restricted compared to the levels of access expected and found in more settled regions.

The future situation is likely to deteriorate further. The costs of motor vehicle ownership and use are likely to increase significantly in the next few years, increasing the burdens on low income people. For example, the effects of 'peak oil' and climate change adaptation will be seen in higher fuel prices. Given that fuel prices in remote areas are already high by national standards, the effects of further price increases will be most sorely felt in such areas. Questions about personal debt and car ownership, including the wider costs of vehicle ownership and total levels of expenditure on vehicles, will become of increasing concern. On a related matter, while older vehicles based on longstanding, 'simple' vehicle technologies have been reasonably amenable to servicing and maintenance by untrained but interested people, more modern vehicles which have increasingly complex engine, fuel, transmission and braking systems require higher levels of expertise and equipment to perform even otherwise basic servicing and maintenance tasks. As such vehicles age and are passed along the chain of vehicle ownership in society, so existing problems of vehicle reliability may be exacerbated and new problems with the effective running of the vehicles may emerge.

Table 5.3 of this report summarised the strategic measures available to address five broad transport needs of Aboriginal people. These needs were:

1. a preference for door to door travel
2. a need for group travel including children
3. a need for low fares
4. a lack of understanding of how to use transport or what the rules are for the use of different forms of transport
5. a need for demand responsive services rather than scheduled services.

Taken together, these needs provide a useful explanation of the prominence of the car as a transport mode, because the car largely meets all of these needs at present. In terms of transport policy and planning, it is necessary to consider how other forms of transport could be introduced or adapted to meet the needs of Aboriginal people in alternative ways.

For *door to door travel*, taxis and minibuses will already provide such services, although the potential travel distances for such services may be quite short. An examination of the opportunities to provide door to door bus public transport is required, which would include the spatial extent of the route coverage provided by existing bus services.

Group travel using bus services may be facilitated through the introduction of group travel ticketing schemes. Group travel in taxis and minibuses, subject to the establishment of appropriate group sizes for the different vehicles, can also be encouraged. There is also a role for the enhanced use of community vehicles to provide for group travel, again subject to appropriate group size.

In terms of the *need for low fares*, community transport generally runs on a 'no fare' principle and this should be maintained. Taxi and minibus services may require the coordination of subsidies with Aboriginal service providers and include reasonable levels for group fare rates. Regular bus transport

should include fare concessions, perhaps through targeted subsidies, which again can be coordinated with Aboriginal service providers.

A *lack of understanding* of transport can be tackled by the introduction of education officers able to communicate ideas and knowledge for all transport modes. This should also include considerations of safe practices for the use of cars.

The need for *demand responsive services* relates to the ability to start a journey at any time, or at least within a short time after making the decision to travel (say within the hour). Personal transport such as the car offers demand responsive service as long as the vehicle is available for use. Community transport, taxis and minibus services can provide a service within a short time frame of a request being made, but regular scheduled bus services will rarely be able to do so. There is a case for encouraging the use of non-scheduled bus services, but this will be limited by the size of the available vehicle fleet.

An affordable public transport system for remote areas in desert Australia is essential, and will become increasingly important as increased vehicle complexity and fuel prices affect the overall affordability of motorised private transport. Investigation of how to provide public transport alternatives must be a primary question for consideration. There is evidence that scheduled fee-for-service transport – when designed to account for group travel and low fares – is a feasible solution, but further investigation is required. In particular, the methods for evaluation of such ‘special purpose’ public transport services need to be revised and extended. Any economic analysis (e.g. cost-benefit analysis) will need to account for the reality of present travel conditions and behaviours in remote areas, which may be quite different from those experienced elsewhere. A preponderance of unregistered vehicles, traffic offences and traffic injuries and fatalities needs to be taken into account in an economic analysis, whereas this would not necessarily be the case in general in other locations. The possible impacts of the state of the regional transport system on other areas of government expenditure, such as health, and crime and justice, would also need consideration in this analysis.

The above issues lead to a number of research questions that can be formulated into a research agenda on regional transport in desert Australia:

1. formal conceptualisation of ‘the community’ as a regional network of kin and settlement centres, in which individuals are constantly mobile. This perspective will then provide for the proper consideration of policy, service provision and economic development for communities in remote areas
2. data collection on Aboriginal population mobility including fine grained quantitative data collected over reasonably long time periods, as well as qualitative information, that may then be used to shape policies, programs and services. ABS census data is of limited analytical utility in these considerations. This requires the refinement and extension of the tools for data collection and analysis, including the development of tools that can fully model ‘circular movement’ and can capture variations in timing, duration and frequency of travel for different Aboriginal regions, as well as the spatial patterns involved. The inclusion of a review of the transport resources and services available in remote communities would also be useful. Transport provided for access to schools is a major component of Government transport provision in rural Australia, so that investigating access to school in remote communities may be a useful means of better understand travel behaviour and the availability of transport resources
3. detailed study of the road safety situation affecting travel in remote areas, as opposed to the more general road safety analysis that may not account for the specific features of road travel in remote areas. Crash frequency and severity and measures of exposure (e.g. vehicle km of travel in remote

- area road networks by vehicle type) would be part of such studies, as would research on the behaviour and attitudes of road users resident in remote areas
4. development of asset management systems that provide information on the state of the road network in desert Australia, particularly for secondary, unsealed roads in that network (on the basis that the primary roads and highways will already be included in existing asset management systems)
 5. methods for the economic and social evaluation of transport service provision, especially public transport services, that account for the actual performance of the existing transport system and the behaviour of the study area population, and consider the range of non-transport impacts (including health and crime and justice impacts) of the transport system
 6. the development of alternative scenarios for wider (or even global) influences on the operation of transport systems in remote areas, including 'peak oil' and climate change adaptation, which can then be used to set parameters for the long term study of remote area transport system performance
 7. study of potential transport options to help overcome known deficiencies in existing transport service provision, especially the occurrence of 'stranded' people well away from their home settlements. Options would include 'sweeper buses', alternative fare structures, transport vouchers, car sharing schemes, combined freight and passenger services, transport maintenance capacity building, the development of appropriate information services, and driver education programs for remote communities. A review of the potential for outreach of services versus centralisation would also be useful, and
 8. exploring transport related disadvantage in remote communities. Access to transport is a major barrier to social and economic participation in remote communities. It is therefore necessary for research to explore the nature of these barriers and to identify how they impact on community life and well being in remote communities. This work should be able to establish the relative significance of transport barriers to the wider issue of social disadvantage in remote communities.

The main recommendation of this scoping study is that the Desert Knowledge CRC adopt this research agenda as a key component of its future research programs and promote it among the relevant public sector agencies with responsibilities for transport planning and operations. The involvement of other agencies, with interests in the research area, including education, health and crime and justice should also be considered, perhaps leading to a 'whole of government' approach to the question of providing safe, efficient, equitable and appropriate transport services in desert Australia.

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