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Viability analysis for desert
settlement and economy:
The transport and mobility interface

Noah Pleshet

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The Desert Knowledge Cooperative Research Centre (DK-CRC) is an unincorporated joint venture with 27 partners whose mission is to develop and disseminate an understanding of sustainable living in remote desert environments, deliver enduring regional economies and livelihoods based on Desert Knowledge, and create the networks to market this knowledge in other desert lands.

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Abbreviations and acronyms

AYAC	Ananguku Yiwarra Aboriginal Corporation
CAT	Centre for Appropriate Technology
CDEP	Community Development Employment Program
CLC	Central Land Council
DHCS	Department of Health and Community Services
DK-CRC	Desert Knowledge Cooperative Research Centre
EFI	Electronic Fuel Injection
NT DPI	Northern Territory Department of Planning and Infrastructure
PATS	Patient Assisted Transport Scheme



Viability analysis for desert settlement and economy: The transport and mobility interface

Noah Pleshet, Centre for Appropriate Technology and Desert Knowledge CRC, Alice Springs.

Abstract

This paper, which builds on Working Paper 1 – Value in and of Desert Australia, is an empirically focused contribution to the Desert Knowledge Cooperative Research Centre (DK-CRC) analysis of desert settlement viability. It examines the interface between population mobility and land transport systems, a relationship that is fundamental to economic activity in desert settlements. To this end, the paper draws on analyses of population mobility amongst Indigenous and non-Indigenous people in central Australia. It also incorporates data on vehicles and road maintenance, and studies of remote transport schemes. Together these different resources show (i) that Indigenous mobility and vehicle use in central Australia are distinct from non-Indigenous patterns; and (ii) that while access to motorised transport has facilitated the elaboration and extended reach of certain Indigenous activities, it may not have facilitated enhanced wellbeing. Recent data suggests that there is an exceptionally high quantity of unregistered cars, and people per vehicle, in the Alice Springs hinterland. 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 Indigenous people to continue living in dispersed desert settlements. It seems clear that desert settlement viability is unlikely to be sustained without interventions which improve Indigenous access to transport, and which generate opportunities to be involved as employees and producers in transport services.

Key words: transport, mobility, settlement, economy, viability.

1 Framing desert transport and mobility

This paper examines desert transport systems and related processes of population mobility. It shows how transport and mobility are fundamental to an analysis of desert settlement economies. Many of the Desert Knowledge Cooperative Research Centre's (DK-CRC) proposed activities would gain from the development models for the spatial system of desert settlement. The character of these spatial processes are determined in part by the regional distribution of resources, and bases for livelihoods, as well as the quality and quantity of transport between them. In addition, DK-CRC proposes that understanding differences between broad ecological regions across Australia, is crucial to understanding the economy of the desert. Wand and Stafford Smith (2005:2) propose a definition of 'desert Australia' that incorporates the arid and semi-arid ecological regions. Desert Australia is a sparsely settled area of approximately 5.5 million km², which takes in much of Australia's 'rangeland' economic zone (see Holmes 2002). Notably – particularly within the rangeland zone – while 'industry' or 'sector' models of economy have persistent appeal, it is now more familiar to pose questions of economic development in terms of 'regions' (see Fargher et al. 2003:141; Taylor 2003). The concept of 'region' has received some attention in significant policy documents such as the NT Government's Building Stronger Regions (2003), and the earlier Reeves Report (1998), which reviewed the NT Land Rights Act. Since the publication of these documents, there has been debate about the sociological accuracy of the different regional geographies they deployed (Morphy 1999; Holcombe 2004). However, most importantly for discussion here, such a debate only serves to reinforce the importance given to spatial models in contemporary policy analysis. The proposed DK-CRC model of a 'settlement' as a spatially defined unit of housing, infrastructure, and services, builds on this trend.

In light of these observations, an analysis that clarifies the spatial economy of desert Australia is required. This might advance understanding of the spatial conditions of settlement viability, as well as the social phenomena associated with them. My focus here will be on population mobility and land transport technology, with the relationship between the two suggesting a particular economy and cultural life in central Australia (see Berryman & Associates 2001; Hamilton 1987; Peterson 2000). I am concerned with the different ways people move around in a region, in combination with the things that make this possible, from working vehicles to passable roads. This discussion intends to further understanding of what might be called the territorial dimension of viability analysis. Following on from the conceptual framework established in Working Paper 1, viability is defined here according to the range of capacities a settlement has to transform resources into livelihoods, now and in the future. This paper highlights the relative capacities settlements offer their communities in terms of spatial movement. While desert population mobility is created by the dynamics of Indigenous social life, it also comes from an uneven regional spread of goods and services, and a strong desire to access them, even under difficult and costly conditions. The capacity to move within a region, a key aspect of territorial viability, is perhaps the lowest threshold for access to economic opportunity, both on Indigenous lands and in larger economic centres.

It is important to recognise the significance of air travel in both tropical and desert Indigenous domains (see Lawrence 1992; Berryman and Associates 2001). Aircraft are the dominant mode of transport for such things as medical emergencies in remote areas, and also for predominantly non-Indigenous fly-in/fly-out employment. However, for everyday transport, most desert dwellers

travel in privately owned vehicles, or as passengers on fee-for-service trips. In recognition of this, road transport will be the focus of this paper. A further premise of this paper is that, for an understanding of desert settlement viability, automobility is a good place to start.

Indigenous settlements represent an extreme case of conditions which underpin all desert economies, key aspects of which include specific propensities, patterns, and means of human movement (Kinfu 2005; Taylor and Bell 2004; Young and Doohan 1989). Within the region of central Australia¹, Indigenous people constitute the overwhelming proportion of the remote settlement population, and are statistically the most disadvantaged group (Mitchell *et al.* 2005). It is the spatially dynamic quality of desert Indigenous settlement that is commonly noted. As Taylor (2002) has shown, both the number of Indigenous settlements which rely on Alice Springs and the scale of their combined population, is far greater than for any other service centre nationwide. Alice Springs has a total remote settlement 'service population' almost twice the scale of Darwin's. In addition, the average resident population of individual Indigenous settlements serviced by Alice Springs is five times smaller than the average for remote settlements serviced by Darwin, and two and a half times smaller than those that surround Katherine. Most settlements serviced by Alice Springs are below the size threshold associated with having basic services on site. As Taylor points out (2002:13), if we assume that Indigenous people still access financial, health, and other services, we would expect substantial population mobility to result. For their part, non-Indigenous residents of the desert live largely in urban centres. They are therefore less mobile within the region, and less affected by the unevenness of goods and service outlets. However, their residence in the desert typically relates to work roles, and is very labour market sensitive (Bell and Ward 1998:65–7; Taylor 2003:263; Access Economics 2003:4). This generates persistent longer-term patterns of movement between desert and coastal Australia.

To what extent is mobility the business of desert settlements, and not simply the 'problem' of their Indigenous residents? How does the development of transport systems intersect with this business? These questions intend to uncover an understanding of the regional geography of Indigenous settlement and mobility, as well as the patterns of desert settler society. A focus on the activities and artefacts of transport technologies could provide grounds for testing assumptions about settlement viability in desert Australia. It could also open up different ways of describing how shifts in demography, or service regimes, might cause changes in the ways desert people work and move.

This paper will be structured in the following way. Section 1 will outline the historical and contemporary trends in desert automobility in central Australia. Section 2 will comment on the social and economic implications of different mobility patterns, among sectors of the Indigenous and non-Indigenous desert population. Section 3 outlines the role of transport in economic development, as postulated in international and domestic studies. It comments on the function of road planning and maintenance, and remote area bus travel in promoting mobility and enhanced desert settlement viability. The reader should gain the following from this discussion: firstly, a sense of how a particular transport system has developed at the centre of desert Australia; secondly, an idea of how this system has grown along with different kinds of human movement, Indigenous and non-Indigenous; and thirdly, what this might mean for Indigenous people who wish to live remote, in times of increasing transport costs.

¹ Central Australia was recently defined as the aggregate of the 'Alice Springs' and 'Apatula' Regions of ABS census Indigenous geography (Mitchell *et al.* 2005).

1.1 History and automobility in central Australia

In the period before and after extensive use of motor vehicles, transport in central Australia was also reliant on rail and pack animals. In the 1930s, camels were required to transport fuel and supplies for long-range automobile excursions, such as those by prospectors Harold Lasseter and Donald Mackay (Madigan 1944:43). When transport time was a minor factor, cameleers had a cost advantage in moving heavy goods. During the Great Depression, parts used to maintain trucks were in short supply, and this led to a greater demand for camel services (1944:52). The first major modernisation of the central Australian transport system occurred with the completion of the Adelaide rail link in 1929. Rail transport improved conditions for stock turn-off, and promoted further owner-operator pastoral development in the Alice Springs district (Rose 1954:169).

Cars and trucks were introduced on a large scale during the military occupation of Alice Springs in 1942, an event that followed the bombing of Darwin. The link between Adelaide and Alice Springs became the source of supplies for the northern front. Donovan (1988:188) explains how the Darwin Overland Maintenance Force was charged with upgrading the road north of Alice, and maintaining supply lines over the 1,000 km to Larrimah, the southernmost extension rail from Darwin. At the end of the war military vehicles and road plant equipment were sold cheaply to local pastoralists and small-scale mining operations. At the same time, around 1,000 Indigenous workers employed as civilian labourers in road works and construction were laid off. In the Alice Springs district, the government graded roads after the war (Rose 1965:25). Rowse (1988) describes post-war changes for Aboriginal people involved in pastoral work. He notes that road transport improvements associated with the Beef Roads program (from 1962), which aimed to improve trucking routes between remote pastoral areas and major markets, terminated most droving work within less than a decade (1988:159). By 1970, substantial improvements were completed on the Tanami Road between the Stuart Highway to Yuendumu, and the Outback Highway between the Stuart Highway and Plenty River. While the Beef Roads program financed work on some remote roads in central Australia, gravel roads in the area south of Alice Springs received virtually no funding.

In the early 1960s, Rose (1965) worked with Anangu at Angas Downs, 200km SW of Alice Springs. He noted their extensive travels to Areyonga, Uluru, the Petermann Ranges, and Erldunda station. These trips were made mostly on camels and donkeys, or at times by hitching a ride from suppliers or tourist buses. Peterson traces the watershed of Aboriginal cars to the commencement of direct welfare payments from 1968 (2000:209–10). He and others have argued that for desert hunter-gatherers and Indigenous pastoral workers accustomed to a living on little, welfare was at first experienced as a kind modest affluence. People regularly accumulated enough funds to own a used car (Peterson 1977:144, Hamilton 1987:52). In 1970, Peterson (1977:144) documented the rapid growth of car ownership, and noted an associated intensification of ritual activity. Hamilton reported that in 1970 a camp of Anangu on Everard Station, SA, still had working horses and camels, but that by year's end camp members had purchased two trucks and a sedan (1987:51). Vehicles purchased were

generally poor quality. The NT Welfare Branch reported for residents of Areyonga that ‘cheap vehicles were bought and a few of the unfortunate owners did not even reach the settlement in their cars’ (Northern Territory Administration 1964:60). When the Aboriginal Legal Aid service was established in 1973, a common request from clients was for accompaniment when purchasing used cars. In one solicitor’s opinion, this advocacy had ‘as much of an impact as any representations in court’ (Faine 1993: 62).

Somewhat regardless of their quality, cars were becoming increasingly important for the establishment of outstations on traditional lands, and remained the key determinant of the feasibility of dispersed settlements (Australia 1987:195). Vehicles were funded for a time by the Department of Aboriginal Affairs, or through subsidised arrangements via the Aboriginal Benefits Trust Account. When Crane and Stanley investigated desert homeland economies in 1985, they noted that a 90% subsidy was available in the purchase of four-wheel-drive vehicles for new outstations (1985:158–9). ATSIC funded and leased outstation vehicles in the 1990s through a variety of programs. As Hamilton noted about Ernabella residents, ‘the availability of motorised transport ... further embedded mobility as a social and cultural value’ (1987:48). This means that for Indigenous people, motorcars became something culturally specific. Cars also allowed Indigenous people to elaborate and expand dimensions of their prior economy and social life, but at the same time drew them more fully into a cash and commodity order.

Peterson (2000) shows that more egalitarian (non-site-based) male ritual life has also expanded dramatically with the increased availability of road and air transport. An example of this, he argues, is greater distances covered during Pitjantjatjara initiation party (*jilkaja*) journeys, because of the availability of motor vehicles and aeroplanes. In a similar vein, Holcombe argues that a contemporary Luritja ‘community’ is emerging within the Haasts Bluff Land Trust area, ‘assisted by the mobility resulting from access to vehicles, allowing inter-regional networks to develop through ceremony and sports carnivals’ (2004:13). In these and other respects, Indigenous sociality and cultural life has developed to take full advantage of the technologies and energy supplies available from an encompassing settler society. After the decline of pastoral employment, it seems quite unique that such spatial dynamism has developed principally through practices of resource distribution and consumption, and somewhat independently of mainstream employment, or other endogenously derived productive resources. And while these developments may involve an increasing egalitarianism in male ritual life (Peterson 2000:213), in turn they rely on the vagaries and inequalities of resource politics (see Austin-Broos 2001; 2003).

1.2 Desert transport in contemporary times

A more quantitative and contemporary picture of NT and central Australian road transport emerges from registration data provided by the Road User Division of NT Department of Planning and Infrastructure² (DPI). It indicates that the growth in vehicle numbers registered in Alice Springs, for the period 1991 to 2003, has been more substantial than in other NT regional and desert towns. Proportionally however, a growth of 17% in the total vehicle stock has matched such places as Katherine and Tennant Creek (DPI Road User Division, custom tables 31.12.2004). No other NT centre comes close to the growth in registered vehicles for Darwin and Palmerston, which was around 32 per cent, or 1.85 times the growth rate in Alice Springs. Figure 1.2.1 suggests that vehicle growth profiles varied for different time intervals between 1991 and 2003. Higher growth rates in Darwin during the period 1991–1997 were driven by population growth, and defence administration spending, flowing into economic growth from the mid 1990s. As to why Territory-wide growth rates slumped over the period 1998–2003, it could be expected that this was related to macroeconomic factors. There was a slump in NT output and employment growth at around this time, as major defence relocation projects slowed and the construction stage of the Alice Springs-Darwin rail link had yet to commence (see Access Economics 2003:3). It appears that regional macroeconomic conditions and public sector spending substantially affect the position of the NT transport system over time.

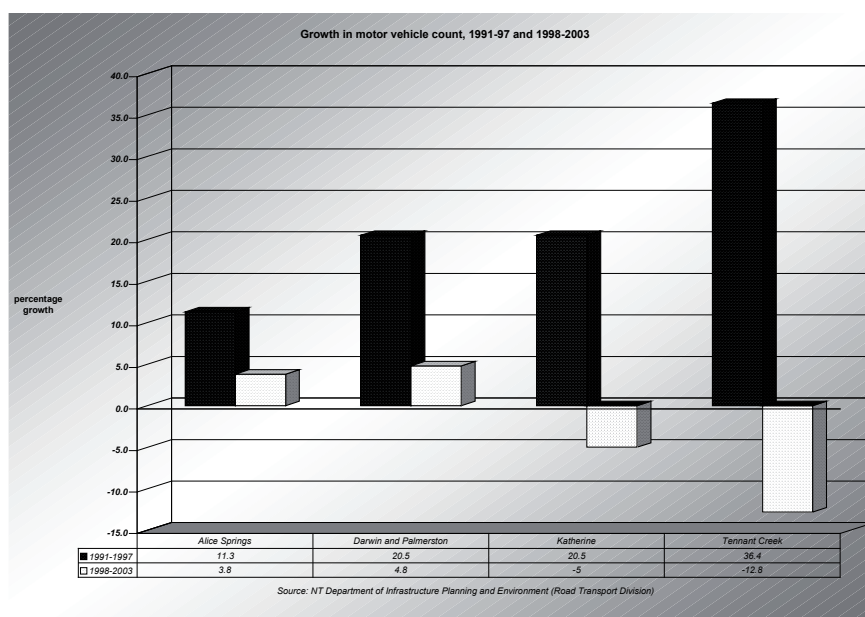


Figure 1.2.1 Growth profile of registered vehicle count at various NT localities

Some inferences about the central Australia vehicle fleet are made here based on a statistical snapshot for postcode regions of 0870 (Alice Springs town), and 0872 (Alice Springs hinterland) within the boundaries of the Northern Territory. The use of this statistical geography is dictated by the available format of the vehicle statistics.³ Because many vehicles have the ‘via Alice Springs’ (0871) postcode listed as their

² The NT Department of Planning and Infrastructure was previously called the Department of Infrastructure, Planning and the Environment (DIPE).

³ Except where otherwise indicated, the data referred to in the figures below was outputted from the DPI Road User Division Motor Vehicle Registry database on 17 June 2005 (DPI Road User Division, custom tables 17.06.05).

registered location, it is not possible to determine the precise regional distribution of vehicles. Postcode areas have to be used as a rough indication of differences between town and hinterland. For these purposes, vehicles listed as registered in the 0871 have been amalgamated with 0872 vehicles to represent the hinterland fleet. On examination of these figures, difference between the Alice Springs town and hinterland fleets appear to be significant and worthy of comment. Vehicles sampled were those under 2.7 tons, including passenger cars and off-road passenger vehicles, and light goods vehicles such as two- and four-wheel-drive utilities. These categories capture most vehicles used for domestic or small scale commercial transport. In this discussion, the category of 'unregistered' vehicles includes only those which had lapsed registration at 17 June 2005, and where this registration had been lapsed for 3 to 12 months.

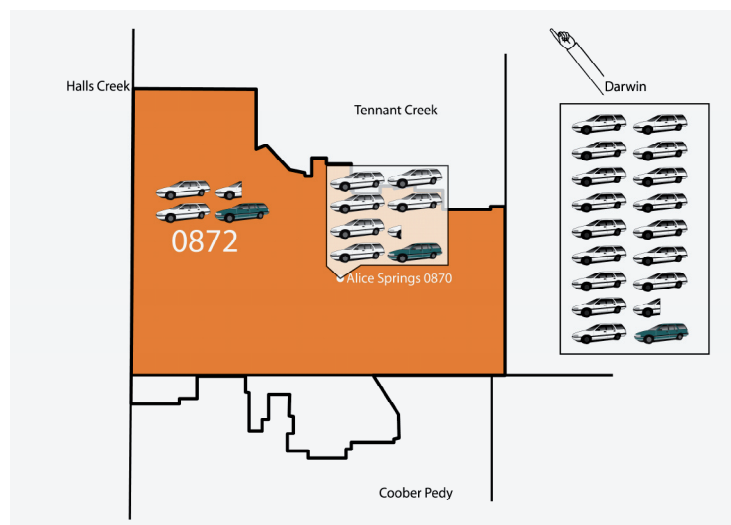


Figure 1.2.2: Registered and unregistered cars in 0870, 0872 and Darwin

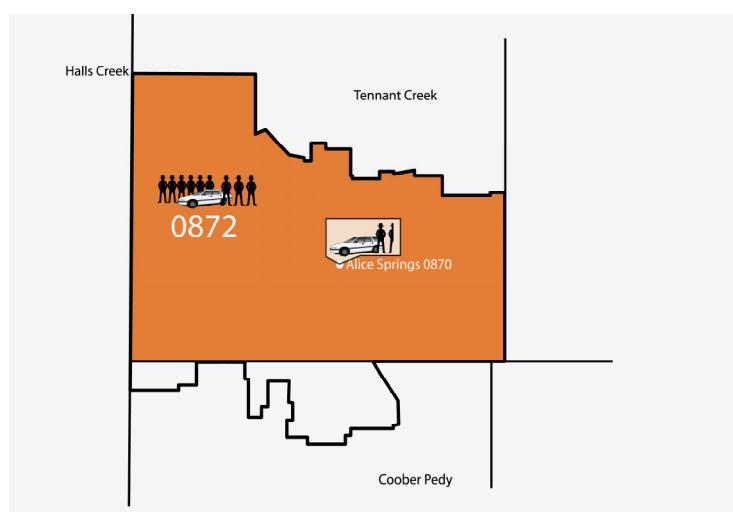
Figure 1.2.2 shows the number of registered passenger cars (white) for each unregistered passenger car with registration lapsed for 3–12 months (green), in the Alice Springs (0870) and Alice Springs hinterland (0872) areas. The figure refers to passenger cars only, including sedans and station wagons. As can be seen, the number unregistered passenger

cars in the Alice Springs hinterland was equivalent to about 38% of the registered number. The same statistic for the Alice Springs town area shows that the number of unregistered passenger vehicles was equivalent to about 15% of the registered stock. The central Australian situation is also quite marked when compared with Darwin, where the number of unregistered passenger cars was equivalent to only 6% of the registered fleet in June 2005. The large box to the right of the figure shows that there are over 16 registered cars per unregistered car in Darwin, compared with around 2.5 in 0872.

These substantial spatial differences in unregistered vehicle rates are difficult to explain by behavioural factors alone. They could in part be explained by the technical challenges of maintaining a vehicle in non-urban areas, and the financial cost of keeping registration up to date. Different literacy rates and remoteness from registration facilities could also be factors. In addition, shared ownership of vehicles has the potential to generate intensive use and rapid mechanical depreciation. It is also the case that when it comes to maintaining and registering a car in remote areas, when compared with looking after a car in Alice Springs town, there seems to be a very different incentive structure in operation. In the everyday Indigenous economy of

‘demand sharing’ between relatives (Peterson 1993; Austin-Broos 2003), the capacity to provide transport is one of the most highly valued services. The value of cars is not found principally in work-related transport, or in the prestige associated with ownership, but rather in its capacity to produce and maintain relationships between people, sometimes separated widely in space. Fred Myers, who worked with Pintupi, put it this way: ‘To have a car, one might say, is to find out how many relatives one has’ (1988:61).

Except for isolated pockets of employment, conventional labour markets do not extend to large areas of the Alice Springs hinterland. At the 2001 census, in the areas directly surrounding Alice Springs Indigenous people constituted 77% of the population. Of this group only 6% were in mainstream employment.⁴ It is perhaps obvious that the majority of Indigenous people who do not find mainstream employment do not have regular work regimes that require a registered car. The incentive to drive cars into an unregistrable state will actually be greater than the incentive to preserve and maintain vehicles. On the one hand, this incentive structure reflects the rate at which vehicles depreciate on remote desert roads. On the other, the structure also reflects where and how social capital is most likely to be accumulated in Indigenous desert domains. In other words, when people typically have to rely on family more than they rely on accumulated cash and commodities, preserving a car will not be socially possible in most cases. Indigenous people may often actually get the most out of a car by working it to death.



When examining vehicle registration status and vehicle use patterns, it is instructive to look at relationships between population and vehicles in Alice Springs town, compared with the same relationships in the hinterland. Although postcode districts are a very imperfect geography for making accurate population estimates, the magnitude of the differences between the regions nonetheless suggests a strong relationship between remoteness and passenger burden per vehicle, even taking into account different regional population estimates.⁵ The burden of potential passengers per vehicle is around 1.5 in town, and around 9 in the hinterland. We should keep in mind here that compared with town fleet, the hinterland fleet has proportionally many more two- and

Figure 1.2.3: People per vehicle in 0870 and 0872

ences between the regions nonetheless suggests a strong relationship between remoteness and passenger burden per vehicle, even taking into account different regional population estimates.⁵ The burden of potential passengers per vehicle is around 1.5 in town, and around 9 in the hinterland. We should keep in mind here that compared with town fleet, the hinterland fleet has proportionally many more two- and

⁴ Figures are for the Apatula Region of the ABS Census Indigenous geography.

⁵ Population figures used are for the 0870 and 0872 areas that fall inside the Northern Territory. They are based on the ABS Statistical Local Area estimates for 2002 (NT Government 2004:162), with 0872 closely corresponding to the Central NT statistical subdivision, minus the figures for the Alice Springs town as reflected in 0870 Postcode region figures for 2001. This gives us an NT 0872 figure of 16,566 and 0870 figure of 23,639.

four-wheel-drive utilities, and many less passenger cars. Since 1994 it has been illegal for people to ride in the back of open-tray trucks, unless the vehicle is fitted with an approved roll cage (see NT Government 2004). It can be seen that the hinterland fleet has more people per vehicle, and fewer less safe and legal seats per vehicle. When we include unregistered vehicles (registration lapsed 3–12 months) in the hinterland fleet, people per vehicle in this region declines by around 1.5 per vehicle or 18%. This shows that there must be very real incentives to use unregistered, and hence potentially un-roadworthy cars, for people who live out of town. It would also be true to say that any car with a full passenger load is used more efficiently than a car that typically carried one or two passengers. It would accumulate many more ‘person kilometres’ per distance travelled over the working life of the vehicle.

Whatever efficiencies or inefficiencies exist, it is now reasonably clear that transport demand substantially outstrips transport supply in the Alice Springs hinterland. This is a problem. Transport system pressure comes not only from demand generated by demographic factors but also from the supply-side. These supply-side factors include energy prices and technological factors which impact on car maintenance and affordability. A key example of how a technological factor affects vehicle maintenance is Electronic Fuel Injection (EFI), introduced in new Ford and Holden passenger cars from the early 1990s. With roughly a decade time-lag, the introduction of EFI has caused a corresponding shift in the skill level required to maintain a used car. Throughout the decade to come, a range of other electronic innovations will become much more common at the low end of the used car market. Fuel system changes have serious implications for the types of vehicle craft made famous in the Warlpiri Media drama series *Bush Mechanics*, in which Warlpiri improvised car repairs in the bush using any materials near to hand. Because many ‘bush mechanics’ learned their craft on older carburettor-based fuel systems, the change to EFI alone has affected the capacity of remote residents to maintain their own vehicles (see Pleshet 2005). These technological changes have the potential to disrupt a range of cultural practices that have come into being and developed along with Indigenous automobility.

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 Indigenous rate of land transport-related accident deaths is approximately four times the non-Indigenous rate (Mitchell et al. 2005:111). Crime and justice statistics for the Alice Springs, and other central Australian police stations, show that driving-related infringements were the most common source of apprehensions in the year 2002/03. However, this is so for non-Indigenous as well as Indigenous people (Mitchell et al. 2005: 135). Across the region, the rate of offences per capita is higher among Indigenous people, at around 12 times the non-Indigenous rate. Some 770 of 1,951 total Indigenous apprehensions were traffic infringement-related. The nationally syndicated *Our Place Radio*, produced by Adrian Shaw at the Centre for Appropriate Technology, Alice Springs, recently reported on traffic infringements in central Australian Indigenous settlement areas. Stuart Baum, police officer based at the Alekarenge settlement, contended that *Bush Mechanics* had

wrongly given Indigenous motorists the impression that it was appropriate to drive unroadworthy vehicles, known colloquially as ‘rubbish cars’ (Our Place Radio, segment 19/2005). He also reported on an ‘epidemic’ occurring around the practice of older unlicensed men encouraging young men, who were also often unlicensed, to drive their vehicles. The expenses associated with this situation must be seen as direct and opportunity costs, especially given the higher probability of gaoling for repeat offenders. National social survey data has shown that Indigenous unemployment has a strong statistical association with high rates of arrest (Hunter 2000:11).

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. Unregistered cars leave drivers, other motorists and pedestrians without third party personal insurance, against which they could claim compensation for injuries and losses. 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 Indigenous settlement residents. This raises questions about the relationship between human population mobility and human wellbeing. Addressing this issue more closely will provide a range of insights that relate transport to the question of desert settlement viability.

2 Two ways of moving: mobility in desert Australia

A recent review by Taylor and Bell (2004) confirmed that contemporary patterns of Indigenous mobility (i) are demographically distinct from the wider population; (ii) manifest propensities for movement which in some respects are elaborations of customary dynamics – in particular circular mobility within wide networks of kin relations; (iii) and are also influenced by Indigenous engagement with bureaucratic structures and service regimes. Although such circular mobility may create enduring routes of movement, these are often missed in fixed time-interval population estimates, and therefore present a challenge to the definition and quantification of a ‘service population’ at one locality (Warchivker, Tjapangati and Wakerman 2000). Taylor (1998:130) reports that, nationally, NT regional centres have the highest short-term Indigenous population presences, while NT rural areas are the main short-term losers of population. This high rate of short-term mobility, is reflected in the 1996 census figures. Indigenous people were 50% more likely than the non-Indigenous population to have moved house in the 12 months prior to the census date (Taylor and Bell 2004:18). In a classic account of incentives underpinning movement, Hamilton argued that key elements of the Anangu economy were as follows:

... the maintenance of networks across a variety of living-spaces, with associated access to resources at those sites, and the ability to resolve the inevitable structural and inter-personal conflicts thrown up by contemporary social realities by moving away from them. (1987:49-50)

These views related to field research in 1970, during the early direct welfare period, but they are sustained by later studies focused on Indigenous mobility in central Australia, particularly those relating to Alice Springs town campers (Collmann 1979; Memmott 1990; Young & Doohan 1989). This body of research has led to a view that Indigenous mobility is best described according to ‘circuits of population movement between places which combine to form functional regions’ (Taylor and Bell 2004:17). These patterns of movement constitute regions, each grounded in certain practices of movement. If we accept this view, then we must also accept that Indigenous modes of regionalism will be specific to their mobility patterns, and these patterns are different from the mainstream. Indigenous regionalism may therefore sometimes diverge from, or even contradict with, more powerful structures and agencies of regionalism. The latter arise, for example, from bureaucratic orders or the processes of the mainstream economy. These divergences between Indigenous and mainstream regionalism are an additional way to describe divergent outcomes in the central Australian transport system.

2.1 Transport and wellbeing in marginal economies

Understanding the nature and distribution of the desert vehicle fleet and the features of regional infrastructure is essential to explaining wellbeing outcomes. International literature points to the significance of transport opportunities for development of livelihoods within marginal economies. One review of global transport, produced by the World Bank for internal planning purposes, stressed the role of transportation systems in promoting trade and the specialisation of productive activities:

Demand for transport services increases with the extension of the input–output relationships of the economy, and the provision of transport services is an important determinant of the pace and locational pattern of development (World Bank 1972:3).

A more recent World Bank account, *Improving Rural Mobility*, assesses options for motorised and other rural transport. It suggests that while the lack of concentrated local demand continues to constrain the development of more efficient regional transport systems, improvements in rural mobility to reduce poverty will require appropriate transport infrastructure, and more affordable means of transport (World Bank 2002). The applicability of this view in desert Australia is uncertain. Taylor and Bell (2004) make a similar point when they describe a general model of ‘mobility transition’ that observes ‘patterned and dominant regularities in the growth of personal mobility in space and time ... seen as interacting with other elements of demographic transition and to be synchronised with phases of economic and social development’ (2004:16). Taylor and Bell establish that Indigenous mobility patterns cannot be understood according this straightforward relationship between improved mobility, and social and economic development (2004:37–38). That is, there is no necessary relationship between improved mobility and wellbeing, as is held in mainstream development literature.

The implication of this is that while immobility through total lack of transport creates genuine difficulties in sustaining health and wellbeing, extensive and continuous travel is not necessarily welfare-enhancing. Different kinds of economic and social activity actually require different patterns of human population movement. In coastal Australia, everyday employment typically requires a daily round of movement within a relatively narrow geographic range. Consistent travel outside that range may make it difficult get involved in standard labour regimes. As Taylor and Bell point out, fairly consistent mobility of Indigenous people at different ages indicates that ‘usual life-cycle events of schooling, mortgage repayment, and career development that generally serve to dampen mobility, have a much weaker influence for Indigenous people’ (2004:28). Kinfu’s recent study supports this view and concludes that Indigenous migration is ‘characterised by family rather than labour-related mobility’ and in other terms, that ‘Indigenous demographic outcomes often require regular residential adjustments’ (2005:20).

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 transport system like that I depicted in Section 1 of this paper. 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. Where transport is largely inadequate, competition for vehicle use results in high discretionary mobility for some, typically younger people, while people of other ages are left stranded. For young people especially, longer duration cycles of movement between ‘town’ and ‘country’ have also become possible because of the payment of CDEP or unemployment benefits through direct Electronic Funds Transfers (see Joint Committee on Corporations and Financial Services 2003). Deposits in a personal bank account, rather than outstation resource centres or settlement stores distributing funds, result in substantial resources flowing out of settlements. It can also remove recipients from the ambit of direct obligations to relatives, or diminish the capacity of senior kin to exercise authority over younger people.

2.2 Non-Indigenous mobility and the national economy

The desert is specific not simply in terms of temporary Indigenous mobility, but also because of non-Indigenous residence cycles in the medium- and long-term. Alongside these is the high-velocity tourism mobility of the desert. Non-Indigenous desert population dynamics are largely generated by labour force participation. An early

publication addresses these patterns: Territorians or Mobile Australians? (Jaensch and Loveday 1983). While this study considers the mobility of the urban 'electorate' during the early phase of NT self government, in doing so it examines patterns of non-Indigenous movement into and out of the Territory. The authors note that 'inter-state mobility is predominately an urban, non-Aboriginal phenomenon.' They suggest that as much as 35% of the NT population were ephemeral or transient over a 5 year inter-census period (1983:7). A survey conducted as part of their study found that only 8% of respondents across the NT urban centres were born in the Territory, although Alice Springs, Tennant Creek, and Katherine had slightly higher proportions (1983:34).

Contemporary self-drive tourism mobility mirrors in certain respects the ephemeral quality of Indigenous short-term mobility in the desert. At peak times, the movement of tourists perhaps approaches the magnitude of Indigenous mobility. However, tourism mobility clearly has different implications than does the mobility of Indigenous people, who actually live in remote localities and demand a range of mainstream services. The vehicles of self drive tourists are much more like mobile islands of coastal Australia. Apart from tourism or target worker mobility, in seasonal industries such as tourism, short-term population cycles in the desert also arise from fly-in/fly-out work regimes. Bell and Ward (2000) use census data to situate Australian tourism mobility as one among a range of types of temporary mobility. While they argue the usefulness of a distinction between production- and consumption-related mobility, they also point out the close functional relationship between them:

In some areas temporary and permanent mobility act in a complementary, symbiotic relationship while in others the former has come to substitute for the latter; but temporary moves may also act as a precursor to permanent relocation (Bell and Ward 2000:104).

In what can be classed as production-motivated temporary mobility, at the national scale surprisingly few people shift for seasonal or fly-in/fly-out work. These workers make up less than 3% of short-term internal migrants. Due to lower population levels in desert Australia, and the significance of resource developments, temporary mobility amongst such workers may have a larger effect than elsewhere. Bell and Ward (2000:103) note high rates of short-term mobility among professional workers, which would be particularly significant for larger desert administrative and service centres such as Alice Springs. A recent review of the NT economy suggests that this non-Indigenous mobility has a particular, if indirect, advantage. Access Economics notes that in the NT:

Unemployment tends to be below the national equivalent, partly thanks to high inter-state migration out of the Territory when there is no work (which helps to maintain a ceiling on unemployment) (Access Economics 2003:4).

While a floating employment:population ratio keeps the official unemployment figures looking good, it has long run opportunity costs. One implication is that stocks of human capital in the desert become more ephemeral and flow-like. At the same time,

the cultural capital that accompanies skilled desert livelihood experience becomes a valuable commodity in certain classes of coastal employment. An additional consequence of this labour market driven mobility is a relative absence of income-deflating unemployment among non-Indigenous desert dwellers. By effectively enhancing the average employment income of those non-Indigenous employees who remain, the polarity of Indigenous and non-Indigenous welfare in the desert economy is accentuated.

3 Policy and practice for viable desert commuting

So far this paper has been largely concerned with vehicle-related aspects of the desert transport system, and the different patterns of population mobility which result. The focus has been automobility, because this is the key means of movement in desert Australia, and arguably also the key to settlement viability. Current regional transport conditions continue to make transport offences in many cases inevitable, and traffic accidents frequent. Discussion has shown that there are significant quantitative differences between vehicle fleets and vehicle use patterns across central Australia. It has been argued that to understand the implications for desert settlement viability, recourse must be made to the particular patterns of human movement which occur in desert Australia. This is not simply about the degree of mobility present in these domains, but the kinds of mobility within the desert population. It has been suggested also that different kinds of economic and social activity are associated with different patterns of population mobility. There is little reason to expect that the mobility patterns optimal for mainstream employment and sociality could be reached from the transport system presently operative in central Australia.

It is one thing to make an analysis which elicits the potential causes of a costly system of automobility; another to show how the unmet demand for transport or infrastructure shortcomings can be addressed. In the desert, we can rely on continuing substantial population mobility, both Indigenous and non-Indigenous. As already discussed, these mobility patterns are driven by a range of cultural and service-related factors which are unlikely to go away. In this context mobility generates both a predictable, if spatially dispersed, consumption pattern, and also an inevitable productive opportunity. Desert settlement viability is unlikely to be sustained without interventions that improve Indigenous access to transport as consumers, and generate opportunities for Indigenous involvement in transport service (and infrastructure) activities, both as employees and potential producers.

3.1 Desert transport infrastructure, maintenance, and livelihoods

Case studies from desert Australia indicate how transport infrastructure and mobility interact to determine the viability of decentralised settlements. Fletcher (1989) has noted that, historically, road funding models led to the systematic neglect of remote settlement roads in WA. This was due to a combination of overlapping governance arrangements, especially those resulting in bureaucratic and jurisdictional conflicts. Fletcher (1989) describes how, after gaining a majority in the Wiluna Shire Council in

1987, Indigenous councillors set about reallocating Shire road funding to access roads on the Ngaanyatjarra Lands. This was achieved partly by reclassifying certain roads used principally by four-wheel-drive tourists as ‘adventure roads’, and diverting funds away from their upkeep (Fletcher 1989:270). In keeping with this kind of funding strategy, Lawrence (1992) argued that it would be most efficient to construct and maintain such remote regional networks according to Indigenous routes of mobility. Roadworks should be ‘based on facilitating internally viable networks of communication rather than providing a comprehensive transport grid linking outstations throughout the region’ (Lawrence 1992:11). While the Wiluna Shire situation was a historically specific circumstance, it indicates the possibility that Indigenous efforts to promote settlement viability through improved transport infrastructure may, in cases of limited funding, result in maintenance regimes which limit engagement with a wider economy. This contradiction resulting from insufficient funding allocations may be quite irrespective of cultural priorities towards maintaining or restricting access to traditional lands.

In Western Australia there has been a strong relationship between road gazettal, funding for repairs, and Indigenous settlement patterns. It was often the case that although particular remote desert roads were an important part of Indigenous decentralisation, they went unrecognised. Taking up this issue, Lawrence (1990) suggests that road and transport planning are a unique aspect of the political geography of remote regions. Lawrence (1990) reviews the case of the ‘Desert Road’ in the latter half of the 1980s, a non-gazetted track connecting Port Headland across the Pilbara to Sandy Blight Junction, north of Kintore, NT. He reports that while the East Pilbara Shire agreed to allow mining companies to use and work on roads for exploration in the Western Desert, they were more reluctant to formally recognise these grids. To do so would have been to simultaneously recognise the Indigenous use of these roads to access their homelands, and potentially expose them to the high costs of maintaining safe access. Because gazetted roads potentially encourage wider access to Indigenous lands, this process introduces an additional consideration. Lawrence (1990:7) suggests that for desert settlements success ‘lies with the healthy tension between external development pressures and Aboriginal motivation, particularly when it comes to road networks.’ The desire to make desert roads might at the same time carry another desire to limit wider access to them.

A situation of neglect paralleling that of WA roads has also been observed in the Northern Territory. Pritchard (1993) has shown how NT road funding regimes were transformed by regulatory changes in 1990 that shifted federal funding to local governing bodies, through untied Financial Assistance Grants. This had particular implications for Aboriginal Councils situated outside major towns. The NT Department of Transport and Works retained control of local road funds, which otherwise would have been directly allocated to incorporated Aboriginal local governments. As a result, funding to roads on Indigenous land was directly reduced (Pritchard 1993:45). Some years later, a government review of expenditure on transport infrastructure on Indigenous land attributed the poor state of infrastructure to this funding arrangement (NT Legislative Assembly 1999). It found not merely that the quantity of

funding was inadequate, but that the funding model effectively reduced the impact of dollars spent. It did so by fragmenting funding, ‘resulting in significant diseconomies of scale’; and additionally, because grants were small and untied, roads money was often diverted towards other community priorities (NT Legislative Assembly 1999:8). There has been no improvement in this situation since, and the majority of funding to remote settlement roads continues in the form of small untied grants.

In central Australia, at least one attempt has been made to establish a regional agreement between Indigenous Community Councils for the purpose of road maintenance. This was in the form of a body called *Ananguku Yiwarra Aboriginal Corporation (AYAC)* which linked Kintore, Papunya, Mt Liebig, Haasts Bluff, and Areyonga (AYAC 1995). This regional cooperation commenced in 1995 but was largely unsuccessful due to difficulties in attaining sufficient funding, and because of political divergences within the proposed area of cooperation. At issue is whether individual settlements can productively amalgamate their road funding allocations within regional bodies. Could such amalgamation generate and sustain critical mass and economies of scale outside the apparatus of municipal governance?

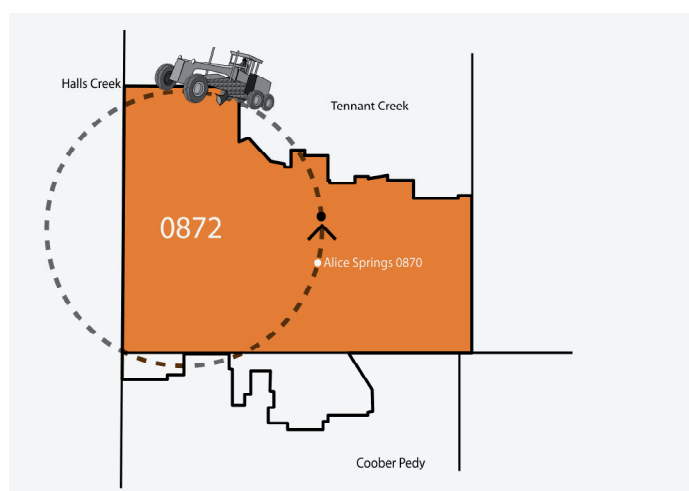


Figure 3.1: Road length per road team required for strict financial viability

by NT DPI at normal rates, a road crew of four to five workers requires around 2,300 km of gravel sheeting road maintenance work, over a 12 month period, in order to break even. The scale of this distance is demonstrated by the perimeter of the circle shown in Figure 3.1.

Road construction and maintenance work is a highly capital-intensive activity, and the economies of scale required for commercial operations are difficult to attain for small regional cooperative efforts between Indigenous settlements. Advice for the Local Government Association of the Northern Territory indicates that if fully funded by NT DPI at normal rates,

Capital equipment required for this crew would be two graders, a roller, water truck, two tip-trucks, front-end loader, accommodation and other facilities. These factors suggest that a wide network of cooperation would be required in order to accumulate the work sufficient to break even, given the machinery and equipment required. Because a large number of settlements would have to be involved, perhaps across significant areas of the Northern Territory, the cooperation efforts themselves would arguably require significant resources and institutional structures to achieve effective coordination.

3.2 Desert commuting: inroads for remote area bus connectivity?

In terms of meeting demand for road transport, part of the answer may be in fee-for-service transport. This point was examined by a study commissioned by Tangentyere Council known as the Central Australian Aboriginal Transport Scoping Study (Berryman & Associates 2001). This report suggested the need for a more detailed study of Alice Springs regional bus services, but not one that took a narrow commercial feasibility approach. It indicated that a previous bus feasibility study conducted in the Barkly Region was inadequate, largely because it focused on the feasibility of a single model. The model in question emphasised capital acquisition, maintenance, and cost recovery, without identifying possibilities for different service frequencies and business models. The Tangentyere Council study notes that the only fully commercial remote bus service operating in central Australia was established through the existing relationships the proprietor had with the communities he serviced. This service, known as Centre Bush Bus, was not planned according to any feasibility study, and has adapted its business strategy to meet perceived demand. Until recently, the Centre Bush Bus operated weekly round trips from Alice Springs to Docker River and Tennant Creek, as well as charter services. In mid 2005, a twice-weekly route to Yuendumu by 22-seater bus was commenced, and continues to operate. This was despite the fact that, during the initial period of this route's operation, the population of Yuendumu was at less than a third of its typical level, hence reducing potential passenger numbers.

Apparently in response to the Berryman and Associates (2001) study, a central Australia bus feasibility study was conducted for the NT Department of Planning and Infrastructure (then known as DIPE) by consultants Booz Allen Hamilton, and completed in September 2004. The study was commissioned under the NT Government's Quality of Life program, to specifically address concerns about remote settlement residents being stranded in Alice Springs. Because it aimed to address this issue, all options considered were based on return bus services. A price structure that created an incentive to purchase non-transferable return tickets was deemed essential. Booz Allen Hamilton (2004:5) indicated that there are a number of settlements in this Alice region with a population greater than 500 which lack a scheduled bus link. They also note that 70% of the regional remote settlement population which relies on Alice Springs has no scheduled transport services.

The study identified a range of potential service 'corridors', such as Larapinta Drive to Ntaria; and Kintore via Papunya, Mt Liebig, and Haasts Bluff. It estimated passenger numbers for each, as well as the service frequency which was deemed feasible given passenger estimates. Stage Three of the Booz Allen Hamilton (2004) report developed business cases indicating expected level of cost recovery on each route. Four 'corridors' are costed, including potential cost savings to be made from the Patient Assisted Transport Scheme (PATs) of the Department of Health and Community Services (DHCS), and the Tangentyere Council's 'Return to Country' program. PATs spending is for essential medical-related travel by road or by air, and is provided for patients and their escorts, who reside in settlements greater than 200km from Alice Springs. It was observed that for those communities with bus

services, 67% of PATS clients travel by this means to Alice Springs. It was therefore projected that an extension of bus services to remote settlements with a population greater than 200 would result in a \$100,000 saving on the DHCS budget.

The Hermannsburg/Ntaria corridor projections are instructive of the particular challenges facing scheduled bus transport in the region. Ntaria is the largest community in close proximity to Alice, with a connecting bitumen road. A daily service was costed, but because it is only 125 km from Alice Springs, Ntaria does not attract PATS funding, and therefore a bus service would generate no cost savings on these grounds. The resulting calculation was that Ntaria offered the lowest cost recovery of the four corridors assessed. When the feasibility of introducing further transport services is at least partly assessed on the basis of cost savings, it may often depend on arbitrary geographic boundaries for particular programs. This is not to suggest a deficiency in the Booz Allen Hamilton study, but merely the way in which potential policies are in part constrained by past decisions. For example, a settlement 195 km from Alice Springs may require bus transport just as much as one 205 km away, but that extra 10 kilometres could leave the more remote settlement better placed to achieve one. The same feasibility switch points, which are purely a product of geographic or administrative boundaries, occur at state borders. In this regard it is promising that South Australia has been negotiating to establish a service to Alice Springs from Port Augusta via the Pitjantjatjara Lands, suggesting a flow-on from recent efforts to better coordinate services to populations in border regions of central Australia.

Two key points can be taken from the Booz Allen Hamilton (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.

Conclusion

Flows of population and resources between settlements are crucial in desert regions, where the necessities of life as well as economic opportunities are unevenly distributed. This paper has made a preliminary analysis of the interface between transport and mobility in desert Australia, in an effort to better understand desert settlement viability conditions. It has therefore focused on one important spatial aspect of economy in central Australia, and desert Australia more broadly. The history of automobility in the region of Alice Springs provides an illustration of how different spatial economies and viability outcomes can develop across a desert region. It has also described

the development of a transport system that has distinct implications for Indigenous and non-Indigenous people in central Australia. The paper has argued that motorcars have further embedded and elaborated the value of mobility in Indigenous social, cultural, and economic life.

In the Alice Springs hinterland, high rates of unregistered vehicles, traffic infringements, and land transport accident deaths, suggest that a distinctive incentive structure operates with respect to motor vehicle use and maintenance. These incentives are significantly different from the incentives in Alice Springs town. Poorly maintained vehicles and infrastructure make this transport system vulnerable, and hence also the settlements it connects. Moreover, this sometimes vulnerable means of transport coincides with extensive Indigenous mobility – patterns of movement associated with livelihood activities outside mainstream employment. In combination with the relative absence of work in remote settlements, these factors make it more difficult to establish a commonly held relationship between mobility and wellbeing in central Australia. These factors indicate that an increasing social burden is being generated by automobility, especially as when it is combined with rising fuel and vehicle maintenance costs.

Given the direct and indirect costs of transport, the conditions of this regional transport geography impinge on the capacity of Indigenous communities to remain in dispersed remote settlements. It seems evident that desert settlement viability could be positively affected by interventions that (i) improve Indigenous access to transport as consumers, and (ii) generate opportunities for Indigenous involvement in transport service and infrastructure activities, as employees and producers. Considering the evidence, the former seems a greater opportunity than the latter. The economies of scale required to undertake profitable roadwork are unlikely to be reached by small-scale Indigenous community council operations, even given successful regional cooperation. The opportunities may be modest within existing arrangements for roads infrastructure and transport, yet such transport activities may still be desirable targets for employment generation. The degree of unevenness, and regional centralisation of work opportunities may make the development of regular transport services to larger desert centres such as Alice Springs essential in the medium-term.

In light of this, an affordable fee-for-service remote transport system is necessary not only now, but will become increasingly important as increased vehicle complexity and fuel prices continue to undermine the overall affordability of privately owned transport. The importance of such thresholds and constraints is in part a reflection of Altman's (2004) observation that the economy of remote Australia, and the NT especially, will always be subsidised to some extent. What needs to be emphasised is that the situation reviewed here is unlikely to generate patterns of population mobility consistent with settlement viability in the long term. While automobility in central Australia promotes extensive circuits of movement within the region, this movement will not always be consistent with sustainable livelihoods and viable desert settlements. The problem is not simply a scarcity of transport in remote desert settlements, but rather the consequence that more people will inevitably use means of transport that are unsafe, illegal, or both.

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