DESERT KNOWLEDGE CRC

A response to the National Water initiative from Nepabunna, Yarilena, Scotdesco and Davenport Aboriginal settlements

Meryl Pearce
Eileen Willis
Carmel McCarthy
Fiona Ryan
Ben Wadham

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36

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Government of South Australia
Department of the Premier and Cabinet

Cooperative Research Centre for Aboriginal Health

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United Water

CRC Australia

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Abbreviations/Acronyms

AARD	Aboriginal Affairs and Reconciliation Division
ABC	Australian Broadcasting Commission
ABS	Australian Bureau of Statistics
ADWG	Australian Drinking Water Guidelines
AGHE	Australian Guidelines to Healthy Eating
AHA	Aboriginal Housing Authority
AHC	Aboriginal Health Council
AIHW	Australian Institute of Health and Welfare
ALT	Aboriginal Lands Trust
APY	Anangu Pitjantjatjara Yankunytjatjara
ASR	Aquifer Storage and Recovery
ATSIC	Aboriginal and Torres Strait Islander Commission
AW	Alinytjara Wilurara
CDEP	Community Development Employment Projects
CD	Collection District
CHINS	Community Housing and Infrastructure Needs Survey
COAG	Council of Australian Governments
CRCAH	Cooperative Research Centre for Aboriginal Health
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSO	Community Service Obligation
CV	Contingent Valuation
CWMP	Catchment Water Management Plan
DAARE	Department for Aboriginal Affairs and Reconciliation
DC	District Council
DKCRC	Desert Knowledge Cooperative Research Centre
DWLBC	Department of Water, Land and Biodiversity Conservation
ERP	Estimated Resident Population
ESO	Essential Services Officer
FACS	Commonwealth Department of Family and Community Services
FACSIA	Department of Families, Community Services & Indigenous Affairs
FAYS	Family and Youth Services
HDPE	High Density Polyethylene
HDIPC	Household Disposable Income Per Capita
HES	Household Expenditure Survey
ICC	Indigenous Coordination Centres
IDS	Income Distribution Survey
IES	Indigenous Enumeration Strategy
IARE	Indigenous Area
ILOC	Indigenous Location
KL	Kilolitre
LETS	Local Exchange Trading Scheme
LGA	Local Government Area
L/p/d	Litres per day
MDBC	Murray-Darling Basin Commission
MSO	Municipal Services Officer
NAILSMA	North Australian Indigenous Land and Sea Management Alliance
NAHS	National Aboriginal Health Strategy
NCP	National Competition Policy
NHMRC	National Health and Medical Research Council
NRM	Natural Resource Management
NWI	National Water Initiative
PATS	Patient Assistance Transport Scheme
PBS	Pharmaceutical Benefits Scheme
PDM	Population Density Measure
PIRSA	Department of Primary Industries & Resources South Australia
RWH	Rain Water Harvesting
RECs	Renewable Energy Certificates
RO	Reverse Osmosis
STED	Septic Tank Effluent Disposal
SACOSS	South Australian Council of Social Service
SAMLISA	Strategy for Aboriginal Managed Lands
SAAL	South Australian Arid Lands
SEIFA	Socio-Economic Indexes For Areas
SLA	Statistical Local Area
SASP	South Australian Strategic Plan
TDS	Total Dissolved Solids
TPI	Totally and Permanently Incapacitated
UKP	Uwankara Palyanyku Kanyintjaku

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Executive summary

Aim of the study

1. The focus of this study was:
   i. to conduct an economic appraisal of the water costs to householders
   ii. to identify appropriate strategies aimed at reducing water costs to householders while simultaneously promoting water conservation, greater water use efficiency, and the sustainability of water resources
   iii. to engage the community in discussions around the levels of water service delivery that they would be willing to pay for.
2. The study was motivated by the National Water Initiative (NWI) directive which requires more efficient use of water with consideration of the economic and environmental sustainability of water supplies. The NWI stipulates consumption based pricing and a to move to 'full cost recovery for all rural surface and groundwater based systems', while recognising that, 'some small community services will never be economically viable but need to be maintained to meet social and public health obligations'.
3. While the NWI recognises that some settlements will never be economically viable, nonetheless it states that in such cases states agree to achieve 'lower bound pricing' in line with commitments to the National Competition Policy (NCP).
4. The NWI directive to move to 'full cost recovery for all rural surface and groundwater based systems' is motivated by the crisis in water availability in Australia and the realisation of the need to develop and extend existing water conservation and sustainability measures.
5. This project sought to provide a response from four Aboriginal settlements to the NWI directives to move to full cost recovery and to enhance conservation and sustainability measures. The impact on Aboriginal settlements of a move to user pays was examined through analysing the cost of living of in all four settlements with the aim of ascertaining capacity to pay for water or for water efficient infrastructure.
6. Considerable research has already been conducted in Australia that demonstrates that low socio-economic families are increasingly experiencing utility stress. Utility stress is defined as pressure on householders who experience difficulty paying their water, gas, electricity or telephone accounts in any one year.

Methodology

7. The methodological difficulties in accurately estimating population, family composition, employment and income in remote Aboriginal settlements are well known. In this study data collected by community researchers were supplemented with data from the ABS 2001 Census and from the National Aboriginal Health Strategy R3 Project Impact Assessment 2005.

8. The issues of water sustainability and conservation were examined by monitoring household water use over twelve months. This was seen as essential for identifying possible wastage and leaks in the infrastructure. The water audit data also provide valuable base-line data for future evaluation of any improvements in water supply introduced into the four settlements, whether this be via behavioural change or new technologies.

9. In two settlements a contingent valuation exercise was performed to gain an idea of what level of water service these two settlements were prepared to pay for.

Results

10. The hypothetical family at Nepabunna was identified as two adults and one child under 15, with one adult employed in CDEP. The cost of living was calculated to be $452.89, or 82% of the total weekly income of $552.82. This weekly income is only 3% above the poverty line of $536.13. The settlement does not pay for its water.

11. Water supply at Nepabunna is non-potable groundwater and a centralised collection of rainwater from the basketball stadium (potable supply). The analysis of per capita water use in households at Nepabunna excluded the use of the reticulated potable (rainwater) supply. The potable supply is not metered, but should be, to ensure adequate maintenance of the ultraviolet disinfection plant. It is recommended that the potable water supply be monitored. The sustainable pumping rate of the bores is unknown and it is recommended that this be investigated.

12. Average household water use at Nepabunna is 435 L/p/d. When water use in all the settlement buildings is apportioned across the population, the average daily consumption is 479 L/p. The water audit identified a small number of errant households who use more than the average of 435 L/p/d. However, overall there is a strong ethic of water conservation in the settlement.

13. A major source of water use at Nepabunna is the evaporative cooling units, attached to all but two houses, which can use over 960 L/d and account for most of the water use in summer. Questions must be raised as to whether evaporative coolers are an appropriate form of temperature control in a water scarce desert region.

14. The water audit at Nepabunna identified a small amount of 'unaccounted' water of around 5.6% which may be due to infrastructure leaks or unmetered connections. The settlement also employs a plumber on an annual basis to repair fixtures in houses and settlement buildings.

15. Dual flush toilets are fitted in the housing stock that we viewed, but the public buildings do not appear to have water sustainable technologies in place. There is scope for water efficient fittings to be installed in all settlement buildings.

16. The hypothetical family at Yarilena was identified as two adults, both in CDEP employment and two children, one aged 13–15 years and one under 13. The cost of living was calculated to be $597.34, or 97% of the total weekly income of $609.75. This is 3% below the poverty line. The cost of living includes payment for water (to SA Water) which constitutes 0.8% of household income.

17. While the hypothetical family at Yarilena earns more and spends more than the family at Nepabunna, there is one additional child to feed and care for. Also the diet at Yarilena is more substantial than that at Nepabunna and petrol costs include travel to sporting and social events.

18. Household water use at Yarilena averages 208 L/p/d, with additional use of rainwater from two large tanks at each house. The greatest water expense at Yarilena (40% to 60% of the water bill) is the result of leaking infrastructure, partly due to pressure incompatibilities between the internal subterranean piping and that of the SA Water mains. These costs, which are depleting their resources, are paid out of Yarilena Trust funds. A builder in the settlement does much of the maintenance work.

19. It is recommended that a third 18,925 L rainwater tank be installed at each house. While it will only save around 5% of household water costs annually, it is a long-term sustainable saving. It is recommended that the settlement apply for a grant to refurbish the irrigation system from the onsite Septic Tank Effluent Disposal (STED) pond, which has fallen in to disrepair.

20. A move from SA Water onto the Ceduna-Koonibba pipeline will address the costs associated with leaking internal infrastructure. Once the internal leaks are addressed the settlement has the capacity to meet household water costs by maintaining their current internal payment arrangements. However, the unit cost of water will be marginally more and a Community Service Obligation (CSO) subsidy will not be available.

21. Three hypothetical families were examined at Scotdesco: two adults on CDEP; three adults on CDEP and one adult on CDEP. No children were added to any hypothetical family or household. Income for two adults is $507.22; income for a household of three adults was $764.73; and income for the single adult was $254.91. The cost of living for the family comprising two adults was $474.65 (93.5%); the cost of living for the three-adult household was $627.70 (82%); and the cost of living for the single adult was $331.63 (130.2%). Households pay $5 per week for water for the primary household member and $10 for any additional householders or family members. Water costs account for 3.0%, 3.3% and 2.0% of income respectively.

22. The settlement-derived income (from water charges) is used to supplement a FACSIA municipal services grant of $134,000 per year. The grant covers water services, rubbish collection, dust suppression, dog health and other environmental health services.

23. The ability to self-fund future large-scale water infrastructure is beyond the capacity of these individuals and their families. SA Water estimates that it costs around $25/kL to sustain the settlement water supply. This is partly attributable to the high reverse osmosis maintenance costs. The frequency of reverse osmosis membrane replacement is due, in part, to the poor regional groundwater quality.

24. The outlay for reverse osmosis maintenance appears unsustainable. The costs are presently covered by the municipal services grant, although the excessive water costs means a lower proportion of the funds are available for other environmental health services. In future, monies collected from householders for water will need to be ‘amassed’ for future capital and maintenance expenditure.

25. The hypothetical family at Davenport was identified as two adults, both unemployed and one child under the age of 13. The cost of living was calculated to be $496.60, or 104.1% of the total weekly income of $476.82. This is 16.8% below the poverty index (of $557.13). Householders pay $15 per week for their water.

26. Water use at Davenport is dichotomous, with a number of householders showing water efficient consumption and others excessive use. Ideally each household should receive an individual bill from SA Water; however, an accurate audit of water use at the household level was hindered by faulty meters and connections. A drop in water use between the winter and summer of 2007 was attributed to the mending of leaks. Any infrastructure repairs are dealt with, in the first instance, by the local municipal services officer, with plumbers employed as needed and for major work.
27. It is recommended that an audit of settlement infrastructure and meters be conducted by SA Water to ascertain the extent of the need to repair infrastructure. SA Water is under contract to AARD to attend to repairs.
28. Legal issues governing the access of utility providers to Aboriginal land need to be resolved before the federal or state governments withdraw settlement-based funding for municipal services. In addition, the issue of access to utility subsidies needs to be resolved for Aboriginal people living on settlements where they are not landowners or landlords.

Chapter one: Introduction

Context and study objectives

This report examines the possible impact of the National Water Initiative (NWI) on four Aboriginal settlements in South Australia, namely Nepabunna, Yarilena, Scotdesco and Davenport (Figure 1.1). Earlier findings by Willis et al. (2004), which examined water service delivery in discrete Aboriginal settlements in South Australia during 2002–2003, highlighted the concerns of a number of settlements about the possible introduction of user pays tariffs for water services. Given the evidence of the relationship between health and socio-economic status (Morrissey 2003) and the importance of water to health (Bailie et al. 2004), the study found that any move to a full user pays system should be approached with caution. For example, Willis et al. (2004) recommended that strategies to encourage greater water use efficiency needed to be explored before a user pays system was imposed on settlements that did not pay for water, or that paid a minimal amount. In addition, the same study found that there was scope for more efficient use of water resources in some regional Aboriginal settlements.

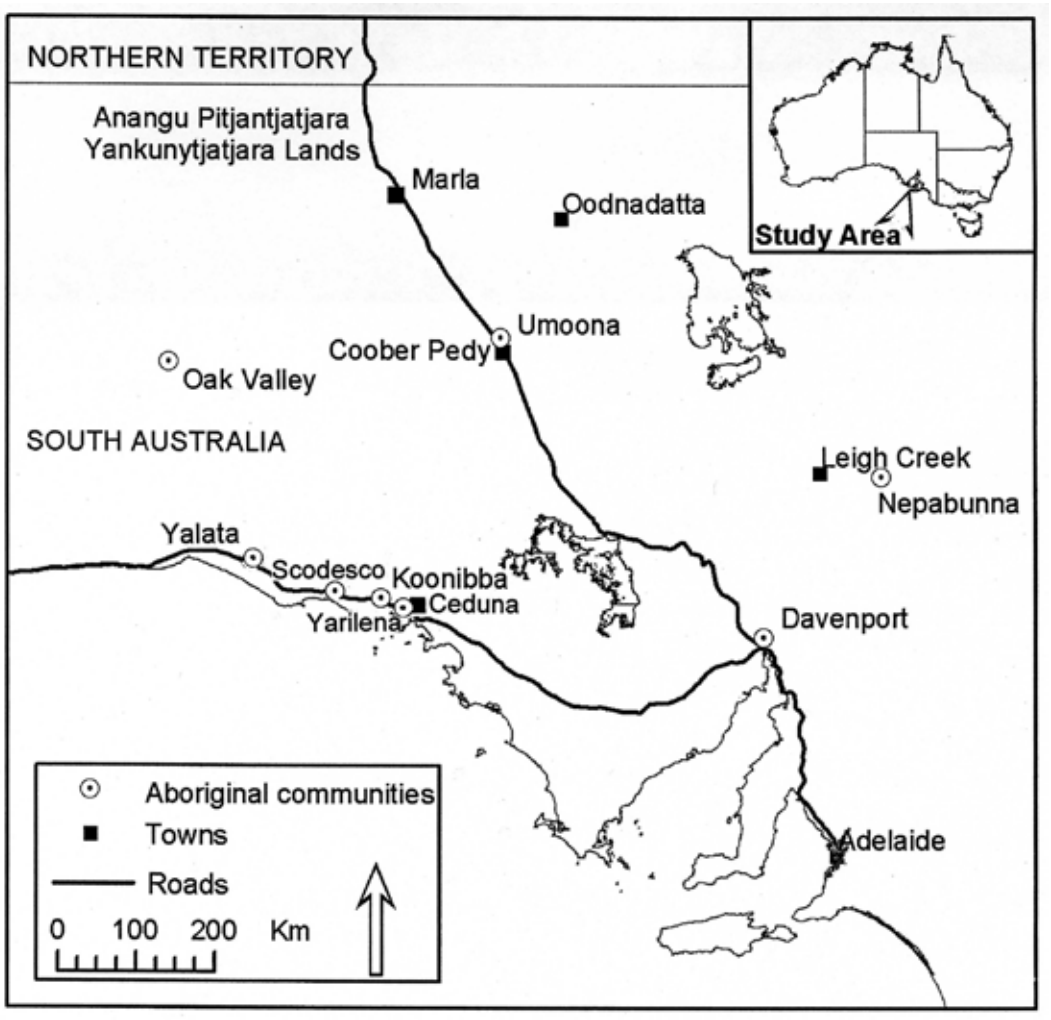

Figure 1.1: Location of Nepabunna, Yarilena, Scotdesco and Davenport Aboriginal settlements, South Australia

Action 3 of the 'Doing It Right Policy' by the Department for Aboriginal Affairs and Reconciliation[1] 2003 (DAARE) states that the South Australian Government is committed 'to finding better ways of delivering current services and ensuring existing resources are targeted as effectively as possible'. This study aims to support DAARE's commitment to implement this policy with Aboriginal settlements. Failure to incorporate Aboriginal interests through recognition and participation has, in the past, led to criticism of the Council of Australian Governments' (COAG) reforms (Altman and Cochrane 2003). This study aims to bring Aboriginal interests to the fore so that they can be considered in policy formulation by appropriate government agencies.

The study objectives are:

i. to conduct an economic appraisal of the water costs to householders

ii. to identify appropriate strategies aimed at reducing water costs to householders while simultaneously promoting water conservation, greater water use efficiency, and the sustainability of water resources

iii. to engage the settlements in discussions about their willingness to pay for the implementation of water saving or water sustaining technologies.

The report is organised into ten chapters. Chapter two provides a literature review on poverty and utility stress and the appropriate methodologies to be used in measuring poverty in Aboriginal settlements. Chapter three outlines the methods used in this study: contingent valuation and the cost of living analysis. Chapters four through to nine deal with the individual settlements: Nepabunna (Chapters four and five), Yarilena and Scotdesco (Chapters six and seven), and Davenport (Chapters eight and nine). Chapter ten presents a summary of the research findings, conclusions and overall recommendations.

The National Water Initiative (NWI)

This project aims to provide an Aboriginal response to the NWI, thus the following discussion outlines those aspects of the NWI that are relevant to remote Aboriginal settlements. In 1994 COAG released its Water Reform Framework which 'recognised that better management of Australia's water resources is a national priority' (COAG 2005). During the 1990s, various jurisdictions responded to the COAG framework and instigated appropriate reforms. The Water Reform Framework provided the basis for the implementation of the NWI Agreement signed on 25 June 2004. The deadline for the implementation of the NWI legislation is 2010, although some intermediate reform deadlines occurred in 2005 and 2006 (COAG 2005). An underlying theme throughout the NWI is the sustainable use of water – being careful how water is used now so that future generations may enjoy the same (or better) quality and quantity of water as we do.

An important component of the NWI in relation to domestic water supply is the commitment to the principle of user pays. In short, the NWI (Clause 65[2]) stipulates consumption-based pricing, full cost recovery, and consistency in pricing policies across sectors and jurisdictions. While perverse or unintended pricing outcomes are to be avoided and it is acknowledged that some uneconomical services might need to be 'maintained to meet social and public health obligations', removal of subsidies (e.g. Community Service Obligations) and full cost recovery remain guiding principles and objectives.

1 In 2006 DAARE moved from a department to a division within Premier and Cabinet and is now the Aboriginal Affairs and Reconciliation Division (AARD).

2 This and subsequent relevant clauses of the NWI are reproduced in Appendix 2.

The NWI recognises Aboriginal and Torres Strait Islander peoples' needs in relation to water access and management through appropriate representation in planning processes and incorporation of Aboriginal and Torres Strait Islander objectives in plans with appropriate strategies developed wherever possible (NWI Clause 53). To date the processes through which Aboriginal and Torres Strait Islander rights and interests will be managed in implementing the NWI are yet to be resolved.

The core elements of the NWI relate to the more efficient use of water, the economic viability of water services and the sustainable use of water resources with consideration of ecological sustainability. The release of the NWI raised the questions: In practical terms how will the NWI affect discrete Aboriginal settlements in South Australia? and How can Aboriginal settlements respond to the NWI? For example, the possible introduction of a user pays system for water has significant implications for Aboriginal settlements, some of which do not pay for water use and experience social and economic disadvantages that adversely affect the health of people living there. Before a user pays system for water can be introduced into Aboriginal settlements, residents must be engaged in the planning and decision-making process to ascertain whether or not Aboriginal people have the capacity to pay for water, or even if they should, given their prior claims to land and water rights. Policy makers will need to go beyond engaging Aboriginal settlements in the planning and decision-making processes, to include discussions about the level of service Aboriginal settlements might be willing to pay for (cf. World Bank 1993; Kaliba et al. 2003).

In relation to the delivery of services to Aboriginal and Torres Strait Islander people, COAG provided policy direction across all jurisdictions. In June 2004, in addition to signing the NWI Agreement, COAG agreed to a National Framework of Principles for Government Service Delivery to Indigenous Australians (hereafter 'the Framework') reproduced in Appendix 1. The principles are: sharing responsibility, harnessing the mainstream, streamlining service delivery, establishing transparency and accountability, developing a learning framework, and focusing on priority areas.

Aboriginal and Torres Strait Islander participation in water service delivery

One of the aims of the NWI Framework of Principles for Delivering Services to Indigenous Australians (the Framework) is 'to achieve better outcomes for Indigenous Australians' in terms of improving delivery of services and enabling Aboriginal and Torres Strait Islander Australians to move towards self-sufficiency (Appendix 1). *The Lingiari Report* (Lingiari Foundation 2002), however, raises concerns held by the Ngarrindjeri people in South Australia, the Karajarri people in Western Australia and Aboriginal peoples in New South Wales about their ability to decisively participate in the management of water resources, and asserts their right to good quality water for spiritual, cultural, social and economic uses (MacFarlane 2004). It is concerns such as those raised in MacFarlane (2004) that the Framework aims to address, as laid out in the section entitled 'Sharing Responsibility'. Sharing responsibility means that the government would like to encourage Aboriginal and Torres Strait Islander people to participate in delivering and managing water services, and through this participation build partnerships with Aboriginal and Torres Strait Islander communities and together develop cooperative approaches to policy and service delivery. The government agencies, therefore, need to foster communication channels between people in Aboriginal settlements and service providers so that all stakeholders can learn what arrangements are working well and contribute to solutions.

The 'Harnessing the Mainstream' section of the Framework indicates that professional providers of water and energy services should also supply Aboriginal and Torres Strait Islander settlements. In the past some remote settlements were serviced by Aboriginal-specific providers. However, SA Water is the principal water service provider in SA and as such possesses a much higher level

of expertise, backup, and infrastructure compared with the small Aboriginal settlement-specific agency Aboriginal Affairs Reconciliation Division (AARD). Similarly, the professionalism of the private sector suppliers of electricity services lowers the risks and liabilities associated with providing this service. The aim is to offer mainstream water services that are complementary to existing arrangements and to reduce the bureaucracy associated with government provision of water services to isolated Aboriginal settlements.

It would appear that at least some of the concerns raised by Altman and Cochrane (2003) regarding Aboriginal and Torres Strait Islander interests and participation have been incorporated within the NWI. The NWI outlines a commitment to 'Indigenous participation at all levels and a willingness to engage with representatives, adopting flexible approaches and providing adequate resources to support capacity at the local and regional levels'. This is to be achieved through Aboriginal and Torres Strait Islander representation in planning processes and the incorporation of Aboriginal and Torres Strait Islander objectives in plans, with appropriate strategies developed wherever possible.

The following section provides details of the likely impact of the NWI on discrete Aboriginal settlements and thereby frames the research objectives.

The responsibilities of water service providers in remote Aboriginal settlements

Part of the responsibility for efficient water use rests with the water service provider and part of the responsibility lies with the settlement. For example, part of Clause 64 (Appendix 2) of the NWI requires the 'efficient delivery of the required services', which makes service providers responsible for ensuring that water is delivered 'efficiently'. This might be interpreted as a duty of care to fix leaking pipes and take steps to identify and overcome inefficiencies in the water delivery service so as to minimise wastage. Service providers will also be bound by Clause 69 of the NWI which requires any new works or refurbishments to be 'ecologically sustainable' before they can be implemented. In terms of remote settlements, this implies that service providers are not permitted to extract water from bores at a greater rate than the natural recharge rate of the groundwater resources over a sustained period nor to install new bores where an aquifer is being dewatered. However, not all jurisdictions interpret this clause of the NWI in the same way.

The requirement for full cost recovery of water services where practicable

Under the heading 'Rural and Regional', Clause 66(v) of the NWI states that states will agree to 'full cost recovery for all rural surface and groundwater based systems', however, 'some small community services will never be economically viable but need to be maintained to meet social and public health obligations'. While the NWI recognises that some settlements will never be economically viable, it states nonetheless that in such cases states agree to achieve 'lower bound pricing' in line with commitments to the National Competition Policy (NCP). It is therefore possible that some element of 'lower bound' costs may be introduced into settlements that currently do not pay for water. The legislation does, however, state that water pricing will be reviewed 'on a case-by-case basis'. Furthermore, the introduction or continuation of a Community Service Obligation[3] (CSO) is permitted. For example, NWI Clause 66 (v) Part c, states that 'where full cost recovery is unlikely to be achieved in the long term and a CSO is deemed necessary, the size of the subsidy is to be reported publicly'. The NWI does, however, add that 'where practicable, jurisdictions to consider alternative management arrangements aimed at removing the need for an ongoing CSO'.

3 The CSO is an SA Water subsidy to ensure that people living in rural and remote regions pay the same price for water as those living in metropolitan Adelaide, regardless of the cost of service delivery to the provider.

The requirement for ecologically sustainable use of water

With reference to the need for water use to be ecologically sustainable, there are qualifying phrases that include 'where practical' or 'where feasible'. In terms of the NWI, it appears that Aboriginal settlements will have to comply with the legislation and show efficient and sustainable water use (Clauses 64 and 69). Clause 82 (iii) part c of the NWI, however, makes allowance for external environmental impacts such as prolonged drought or climate change that affect the availability of water resources. The settlement may suffer reduced access to water of acceptable quality and quantity as a result of these 'environmental externalities'. These factors are beyond the influence of the settlement, and must be recognised and built into water resource accounting systems that make allowances for changes in the amount of water that is available for settlements to use in a sustainable way.

Water entitlements

Much of the NWI pertains to 'water access entitlements'. Part of the reasoning behind the COAG Water Reform Framework and NWI is to provide a response to the development of water trading, and to make a distinction between land and water rights and water access entitlements. In the NWI, the sections dealing with water access entitlements mostly refer to aspects of water trading which affect those parts of the Murray-Darling Basin where it is physically possible to trade water, rather than to water allocations in situations such as the Aboriginal settlements being studied. The NWI comments on Aboriginal and Torres Strait Islander water rights in terms of an opportunity for engagement in management processes, partial recognition of customary rights and native title rights, and the necessity for legislation to be framed so it does not curtail cultural practices. With reference to Water Plans, the latter part of Clause 52 states that 'water plans will incorporate Indigenous social, spiritual and customary objectives and strategies for achieving these objectives wherever they can be developed'.

The requirement to operate under a catchment water management plan

The consumptive use of water must be guided by a relevant water plan (NWI Clause 28). As a legal requirement of the *Natural Resource Management (NRM) Act 2004*, the Arid Areas NRM Board (AA NRM Board) recently released a Water Management Plan that outlines how water resources are to be managed and used.

The Catchment Water Management Plan

The CWMP will not alter the access to water resources that settlements currently enjoy, and it is not intended to affect usual water use. It is designed to control 'large scale works that could have unacceptable impacts on water resources or other users'. Such works could include, for example, building a dam, or interfering with the flow of surface water in lakes or streams. Water use activities that occur on a small scale might not require a permit but the same activity on a larger scale would require a permit, and other activities thought to affect water resources may also require a permit.[4]

Even if a settlement does not engage in activities that require a permit, 'all water users and managers within the region are bound by the general duty of care provisions within the legislation'. Furthermore, in terms of the 'precautionary principle … best practice sustainable management should always be applied when dealing with water resources' (SA Arid Lands NRM Board 2006, p.14). The CWMP aims to be consistent with the requirements of the NWI, the *Aboriginal Heritage*

4 To assist water users the Alinytjara Wilurara NRM Board will work with the Department for Water, Land and Biodiversity Conservation (DWLBC) to produce fact sheets to inform people what will or will not require a permit. The purpose of introducing the permits is to ensure that the water resource use is sustainable, equitable, considers heritage and cultural values, and considers ecological functions.

Act 1998, and the *Pastoral Land Management and Conservation Act 1989*. The CWMP recognises the importance of water to Aboriginal culture and aims to work with Aboriginal communities to identify and protect water resource sites of cultural significance. The CWMP will be reviewed every five years to incorporate new knowledge into policy and procedures.

The area under the Arid Areas NRM Board is broadly divided into regions falling within the Far North Prescribed Wells Areas, as detailed in a Water Allocation Plan and the regions outside the Prescribed Wells Area, which fall under the Catchment Water Management Plan (CWMP). The Far North Prescribed Wells Area essentially covers the parts of the north eastern South Australia that fall within the Great Artesian Basin. In the Prescribed Wells Area current water use has to be registered, and any new requests for water allocations require a licence and will be subject to the regulations that govern water allocation. Outside of the Far North Prescribed Wells Area, the northern and western parts of South Australia form the South Australian Arid Lands (SAAL) region, which mostly comprises the north-east part of the state and the Alinytjara Wilurara (AW) NRM region. The AW NRM region covers most of the north-western part of the state extending from the APY Lands, across to the Maralinga Tjarutja Lands and Unnamed Conservation Park to the edge of the state waters (3 nautical miles out to sea).

The CWMP recognises that in the SAAL region 'there are few alternative water resources and all water is important to those who depend on it'. For that reason one of the aims of the CWMP is to 'help water users broaden their understanding of water resources in their area and assist them to make informed decisions about how resources need to be utilised and managed'. In accordance with the *NRM Act of 2004*, all CWMPs must outline the limits to the amounts of water that can be extracted in a way that takes into consideration environmental externalities such as prolonged droughts or climate change or other environmental factors that might affect the availability of water resources to a settlement (SAAL 2006).

Assessment of the progress in achieving NWI objectives in South Australia

An assessment of the states' progress in implementing the NWI reforms against the scheduled deadlines was conducted by the National Water Commission in 2005 and released as the *National Competition Policy Assessment of Water Reform Progress Report* (National Water Commission 2006). The report states that South Australia's progress towards its NWI commitments had been 'satisfactory', but that there has been 'no clear demonstration of consideration of Indigenous rights during the development of CWMPs' (National Water Commission 2006, p. xix). However, the SA NRM Boards were only proclaimed in July 2005 and are currently in the process of community consultation to develop ten-year strategic plans. In February 2005, the state government established an Aboriginal Statewide Advisory Committee to advise the NRM Council on, among other matters, Aboriginal engagement mechanisms for water resource management.

Debates on Aboriginal water rights

No discussion on the NWI and the possible move to full cost recovery can be undertaken without some exploration of the issue of land (and water) rights. Increasingly, Aboriginal and local people have sought to establish water rights. Public debate on climate change and monetarist government policy mechanisms such as privatising water assets are some of the forces driving change in water use practices and issues of equitable access to water.

Aboriginal water rights: the Australian context

A review of current literature related to Aboriginal water rights indicates that Aboriginal inclusion in discussions around water issues are centred on NRM rather than on water rights, although there is some recognition of Aboriginal water rights in State Water Management Acts. Both NSW and Queensland recognise the rights and interests of Aboriginal and Torres Strait Islanders in their water statutes. Altman (2004, p. 30) regards the *NSW Water Management Act 2000* as being the most comprehensive of all the state Acts in relation to Aboriginal interests, but even so it limits the water rights of Aboriginal people to 'the right to take and use water for domestic, personal and non-commercial communal purposes'. Elsewhere the Act states that 'Aboriginal people must benefit economically, culturally and socially from the changes to how we use water' without defining how this might be done (Altman 2004).

In keeping with this stated objective, the NSW Aboriginal Land Council negotiated with the Department of Land and Water Conservation in 2002 to provide an Aboriginal Water Trust funded through consolidated revenue as one method to ensure that Aboriginal people and settlements will have funds to help improve their water usage and efficiency. Upholding the notion of a water trust, Morgan et al. (2004, p. 71) state that 'a water allocation should be available to each Indigenous nation to enable them to exercise their custodial responsibilities to care for the river system … At the same time there should be initiatives to encourage more efficient use of water'.

In the Northern Territory there is no agreed method for incorporating Aboriginal cultural values into water allocation decisions, but the lag in addressing Aboriginal peoples' cultural requirements is the subject of a project between CSIRO Sustainable Systems Division and Aboriginal people from Daly River (Jackson 2004). Heeding the notion of 'cultural flow' from the Murray-Darling Basin Commission the project is looking at issues arising from the application of a western scientific approach to resource allocation amongst stakeholders from diverse cultural backgrounds. The North Australian Indigenous Land and Sea Management Alliance (NAILSMA), in conjunction with the Northern Land Council's Caring for Country unit, coordinates and addresses issues that are common to the jurisdictions of Queensland, Northern Territory and Western Australia. These bodies offer coordination of community participation in resource management and the exercise of customary rights combined with collaborative research and partnerships with Aboriginal and non-Aboriginal organisations.

In response to the report on water property rights submitted to COAG by the NRM Ministerial Council, Altman and Cochrane (2003) state that Aboriginal people must be considered in water property rights discussions and their perspective understood, valued and integrated because:

- The framework being advocated is based on 'security of tenure, transferability and clarity of specification' which creates enormous uncertainty from the Indigenous perspective.
- The poor economic status of Aboriginal people is partly a result of alienation of their ancestors' property rights and resources (including water).
- Aboriginal people have title to almost 20% of Australian land including water catchment areas so their potential water property rights are large and cannot be ignored.

In commenting on these provisions Altman and Cochrane (2003, p.2) state that 'any proposals to create new property rights in water as proposed by COAG, or in fisheries or wildlife, must recognise customary rights because these are overlapping property interests in such resources'. However, to date there appears to be a reluctance to acknowledge Aboriginal water rights. This is partially due to the greater significance western culture places on land over water, treating land as a fixed, tradeable commodity and water as a less clearly defined commodity (Langton

2002). Aboriginal and Torres Strait Islander approaches to the management of land and/or water resources do not differentiate land from water. Both are seen as components of 'country' (Lingiari Foundation 2002). In the western system of property rights governments commodify water as property and resources in water, such as fish, as 'fishing property rights' (Altman 2004). Using the concept of the 'hybrid economy' Altman (2004) suggests that careful consideration of how the customary aspects of a hybrid economy will interact with the wider commercial water market is needed, otherwise customary use will not be utilised efficiently. Also, if commercial uses of water impair customary use then Aboriginal people could have legal recourse to defend native title interests. In an attempt to address the uncertainty of how future Water Acts may work he suggested that COAG acknowledge and explicitly recognise the potential impact of native title on water property rights, possibly including the development of a national approach to native title rights in water. Native title is alluded to in Clause 53 of the NWI where it states that:

> *Water planning processes will take account of the possible existence of native title rights to water in the catchment or aquifer area. The Parties note that plans may need to allocate water to native title holders following the recognition of native title rights in water under the Commonwealth Native Title Act 1993.*

While MacFarlane (2004) is of the opinion that the NWI intends that Aboriginal and Torres Strait Islander people be included in the water planning process, and that the water plans incorporate Aboriginal and Torres Strait Islander social, spiritual and customary objectives, nevertheless he believes their status or power to influence remains unclear. The NWI assigns the responsibility for involving Aboriginal people in discussions and actions regarding water management and water rights to each state jurisdiction. Within the Murray-Darling Basin there have been a number of reports and studies on natural resource management that have sought the views of Aboriginal people, such as contributions to the *Living Murray Initiative* from the Murray-Darling Basin's Indigenous Nations (Forward NRM and Arilla Aboriginal Training and Development 2003; Morgan et al. 2004). The Forward NRM scoping study identified that Aboriginal people see their own natural resource management issues in competition with government interests. Further, the formal meeting structures proposed by government make it difficult for Aboriginal people to express their views or be heard, so that although it appears that there are opportunities to participate in decision making, the processes remain problematic.

To address some of these barriers Forward NRM and Arilla Aboriginal Training and Development (2003) propose a range of communication strategies to encourage Aboriginal involvement. These include agency representatives visiting settlements: using simple language and pictures of key concepts to convey information: distributing newsletters and advertising meetings on local and Aboriginal media; allowing time to build trust; providing funds for Aboriginal leaders to attend meetings whose dates and times fit around the needs of the Aboriginal representatives; providing resources for Aboriginal people to hold their own forums on the issues before meeting with government agency representatives; and establishing an Aboriginal reference group to help shape questions and formats for meetings, endorse methods of research, provide input, and monitor outcomes of Aboriginal and government collaboration.

Commenting on these approaches, MacFarlane (2004) noted that reports which outline Aboriginal interests in water are all clearly directed towards 'restoring the original values of the water source and its surrounding landscape' through notions such as 'customary flow' but that there is a gap between the perception and the reality of Aboriginal involvement in decision-making processes. Like Altman, he recommends the adoption of certain principles to ensure consistency of approach to Aboriginal and Torres Strait Islander involvement in NRM decision making, stating that there

is an opportunity to take a more holistic approach that could benefit both Aboriginal and non-Aboriginal interests. This includes a holistic management style that aligns with the Aboriginal perspective of an interdependent whole environment, and that deals with the social and economic aspirations of Aboriginal people. The NSW Aboriginal Water Trust and water allocation rights are examples of this that could be considered more broadly.

Indigenous water rights: the international context

Morgan et al. (2004) state that Australian state and territory water laws are increasingly being guided by international law. Lombardi (2004) discusses how the treatment of American Indian interests in water may be applicable to the native title system in Australia. They cite the case of *Winters v. United States*, which became a foundation of early Native American water law. The judgment allowed the establishment of farms within the reservation of Fort Belknap and the Native Americans were entitled to enough water to support farming from the nearby river. The water rights of the Indigenous people were found to be prior to the rights of the white farmers who established farms after them, and so the Native Americans won first rights to the river water. According to Lombardi, Native Americans were able to change their use of water and to enter water markets once their rights had been established. Lombardi states that it is possible for similar agreements to apply in limited cases to Aboriginal people in Australia. Beneficial uses of water such as fishing, domestic or household use, stock watering, navigation and spiritual and cultural uses have been recognised in American law and are also being suggested to exist in the Australian context (Yu and Yu 1999; Lingiari Foundation 2002; Altman and Cochrane 2003; Altman 2004; Jackson 2006; MacFarlane 2004; Morgan et al. 2004).

In writing about international human rights to water, Hammer (2004) states that consideration of the water rights of Indigenous people forms a bridge between the human right to water, control over water as a resource, and water in the context of the whole environment. This approach enables a more collective view towards water issues, so that different understandings of property, and the manner in which one can possess or hold territory, can be discussed. Whilst water ignores arbitrary human boundaries, the discussion of a basic human right to water is made more meaningful for participants and policy makers by the demonstration of 'some form of link to the water source, either at a cultural level or from an understanding of the basic needs' (Hammer 2004, p.151).[5]

Conclusion

This study reports on projects with four Aboriginal settlements from 2005 to 2007 with a focus on exploring sustainable water use and service delivery that would assist them to meet NWI requirements and reduce the cost of water to households. In addition, this study provides an opportunity for Aboriginal people to be engaged in discussions about the provision of water to their lands and to be part of the decision-making process, which is an aim of the NWI.

5 The link between the environment and the recognition of the Indigenous peoples rights is acknowledged by the ILO Convention 169, the Human Rights Committee's General Comment to Article 27, the UN Draft Declaration, the 1992 Rio Declaration, the Convention on Bio Diversity, the Forest Principles and Agenda 21 (for full references see Hammer 2004, p. 151).

Chapter two: Literature review: Utility stress and Aboriginal poverty

Introduction

The main objective of this study is to reduce or avoid additional water costs to Aboriginal communities while promoting sustainable water use in line with the objectives of the National Water Initiative. This chapter explores the various methodological debates occurring in studies that attempt to measure socio-economic status or the impact of utility stress on poverty, and it also explores the difficulty of measuring population numbers and poverty in the Aboriginal context. The chapter is divided into two main sections. The first section outlines recent research that examines the impact of utility stress on the wellbeing of low income families, primarily in South Australia. Utility stress is defined as the inability or difficulty in meeting the cost of water, electricity or telephones. Section two outlines some of the debates surrounding the difficulty of obtaining reliable census data in Aboriginal communities. These data sets are important for determining population numbers and socio-economic status and also for calculating water use on a per capita basis.

Recent Australian studies of utility stress and poverty

Recent studies of poverty in South Australia have explored the impact of increases in the cost of public utility prices to householders (Carson and Martin 2001; Lawrence 2002; South Australian Council of Social Services 2002). The studies demonstrate a correlation between the increasing price of essential services, low socio-economic status, and the declining health and wellbeing of people. These studies also pinpoint areas of socio-economic disadvantage and make recommendations about how socio-economic status, poverty and relative deprivation ought to be measured (Carson and Martin 2001; South Australian Council of Social Services 2002).

According to Carson and Martin (2001) South Australia has a higher percentage of its population living in the lowest income quintile than any other state, but when housing costs are taken into account, poverty levels approach the national average, leaving Tasmania as the state with the highest rates of poverty. Carson and Martin's study examined shifts in household absolute poverty over the last decade, and found that the rate of relative deprivation was lower in South Australia than in other states. This finding was not due to more equitable distribution of income across the population, but to the fact that the state has fewer wealthier people per head of population than other states. Interestingly, they found that poverty rates differed across the state and did not confirm a clear division between urban and rural communities as originally identified in Henderson et al. (1970) and Henderson (1975). Carson and Martin (2001) found that there appeared to be intra-state migration as families or individuals searched for either work or cheaper housing. In these instances families may trade away other community services in their search for employment or affordable housing. Recent studies on Aboriginal socio-economic status, wellbeing, and health note that social inequality is the defining factor in morbidity and mortality rates (Morrissey 2003) and, we would argue, is one of the key motivations for families moving between town, homeland and settlement.

The Carson and Martin (2001) study also noted that some rural areas lack a critical size of population to enable local government to provide the range of services that are taken for granted in urban areas. In these situations the opportunities are more limited for individuals to obtain an

income, to take part in leisure and recreational activities, to purchase essential household and personal items or to make a range of social contacts. Respondents in the Carson and Martin (2001) study reported additional costs of living in rural or remote regions where there were fewer services. Poor public transport means the cost of travel to purchase major items, clothes, or for specialist healthcare services is an additional drain on household reserves, especially given recent historically high prices for petrol. As Carson and Martin note (2001, p. 63) individual social security payments do not adequately compensate people living in under-resourced areas.

Studies of utility stress and poverty in Aboriginal communities

The Anangu Pitjantjatjara Service Resource Management Project 'Cost of Living Study' (Tregenza and Tregenza 1998) was prepared in response to a proposal from ATSIC and AARD to move to full cost recovery for electricity on the APY Lands. Tregenza and Tregenza (1998) constructed a hypothetical Anangu family of two adults employed through CDEP, one pensioner and three children, two of whom were under 15 years of age, to estimate a typical weekly wage. Using data derived from a range of communities across the APY Lands, they calculated that the maximum (not average) wage for a family employed through CDEP was $600 per week once community-based deductions for rent, funerals and other items were taken into account. While not all families cleared $600 per week, this amount was used to determine the impact of a move to user pays for electricity across the APY Lands. In some instances families earning less than the hypothetical $600 per week figure went without food in the days prior to pension or CDEP payments.

The $600 was used to explore the ability of the hypothetical family to purchase food and household items linked to five of the nine 'healthy living practices' outlined in the *Uwankara Palyanyku Kanyintjaku (UKP) report* (Nganampa Health Council, South Australian Health Commission and the Aboriginal Health Organisation of SA 1987). These five practices are:

- wash children and adults
- wash clothes and bedding
- buy, store and prepare healthy food
- control dust
- control temperature.

Family weekly costs include: adequate food, determined in consultation with Nganampa Health and a nutritionist; cleaning agents linked to health; hardware such as brooms, mops, buckets, blankets, clothes and cooking utensils; health consumables such as cleaning agents and some medicines purchased monthly, quarterly or yearly. In total the cost at the community stores on APY Lands was 23% higher than the cost for the same items in Alice Springs. The food basket consumed 85% or $500 of the family's income. The authors note that few, if any, families on the APY Lands can afford to purchase white goods such as refrigerators or energy efficient appliances, both essential pre-requisites for maintaining the health hardware of the house. Personal income for sufficient food, health hardware, adequate storage, and energy efficient appliances are considered to be essential to enable people to make healthy choices. Therefore, increasing the cost of living through user pays for essential water and energy services would decrease the wellbeing of individuals, especially children. The study formed the basis for the *Mai Wiru Regional Stores Policy* (Nganampa Health Council, NPY Women's Council, Anangu Pitjantjatjara and all Community Councils on the APY Lands 2002) which argues for increased subsidies on the APY Lands as part of the COAG trials.

Criticisms of the Tregenza and Tregenza (1998) and similar studies are directed at the hypothetical nature of the approach and the lack of precision about context (Altman et al. 2002). Altman et al. (2002) argue that assumptions are made about the costs of healthy food, not what people actually do purchase with their money, and no detail is provided about the geographical context of the groups in the studies. This includes whether they live in a town, have a car, reside on an outstation or an excision. Clearly research needs to take account of these issues, as geography will impact on the ability of a group to use the customary economy along with welfare and market based economies.

Debates regarding the appropriate research measures to determine poverty

Debates within academic circles in Australia regarding the appropriate measures of social disadvantage are continuing (Travers and Richardson 1993a, 1993b). Carson and Martin (2001) point to an abiding reliance on a small range of measures of poverty, the most popular being the Henderson poverty scales. In their study Carson and Martin (2001), measure 'absolute poverty' using the Henderson scales, as well as 'social inequality' or relative deprivation. Henderson set the poverty line at 56.5% of seasonally adjusted average earnings in Australia for a standard family of two parents and two children with the family head working, and 50.8% for the same family with the head not working (Henderson 1975). The assumption underlying these differences is that non-working adults can use their non-working time to reduce family expenditure. The Henderson model allows for comparisons between different family types based on size. Families with incomes below the poverty line are very poor, while those less than 20% above the poverty line are defined as 'rather poor'. Both groups are defined as poor. The poverty benchmark is modified over time in line with increases in wages, the cost of living, and family size and is published on a quarterly basis by the Melbourne Institute of Applied Economic and Social Research.

There is little agreement among researchers about the increase or decrease in poverty trends since Henderson's first benchmark, possibly because different measures were used. In the view of Carson and Martin (2001) the choice of equivalence scales reflects the researcher's bias as well as the weighting given to income, housing costs and the time period under investigation. One of the criticisms of the Henderson poverty line is that each year different data sets are used to update the absolute poverty line compared with those used to calculate rates of poverty. The Household Disposable Income Per Capita (HDIPC), based on the national accounts (Carson and Martin 2001), is used to update the poverty line, while the poverty rate is set by using data from the Income Distribution Survey (IDS). The IDS has fewer measures than the HDIPC, leading to around a 15% difference between the two indexes (Carson and Martin 2001). Carson and Martin (2001) view these differences as purely academic, as the original poverty line was set sufficiently low to be defined as poverty (Carson and Martin 2001).

A further criticism levelled against the Henderson poverty line is that it does not take into account in-kind transfers from the state to the family. These might include subsidies for transport costs or entertainment. Other transfers within the community include bartering or in-kind exchanges such as the Local Exchange Trading Scheme (LETS), or in the case of Aboriginal communities, supplementing income through hunting and craft activities. Of further significance, Carson and Martin (2001) note that while the Henderson Commission of Inquiry into Poverty in the 1970s took account of housing costs, family size, and labour force status as the primary factors influencing poverty, contemporary changes in the labour market may mean that it is possible to be employed,

yet still live below the poverty line. This is especially so where people are employed on casual rates or in low paid industries or can only access part-time work; Aboriginal people employed on the CDEP are a case in point.

While it is possible to measure poverty in the Australian context and to talk of absolute poverty, various social security provisions ensure that most citizens need not starve and can gain access to adequate health care, education and housing. Therefore, relative poverty is a measure of differences in income between population groups and is based on what a given society determines is the ideal standard of living at that time (Carson and Martin 2001). Similar to the Henderson poverty scales, research on relative poverty is fraught with debate about the use of equivalent measures. There is however, a growing body of research suggesting that the current health status of Aboriginal people in Australia is best explained by 'relative deprivation' rather than absolute poverty (Morrissey 2003). Relative poverty adversely influences health, wellbeing and life chances and there is evidence that relative poverty is on the increase in Australia. This is attributed to factors such as market and wage de-regulation and taxation policy (Carson and Martin 2001).

Carson and Martin (2001) used two indexes to measure spatial differences in poverty: the Socio-Economic Indexes for Areas (SEIFA) and the Index of Economic Resource. SEIFA records the locations of people with low income, low educational attainment, high unemployment and jobs in unskilled occupations. Low scores indicate more families are on low incomes in the area, with little training or access to resources. The Index of Economic Resources includes items such as income, rent, home ownership, dwelling size, number of cars, and family structure. High scores indicate more families on high incomes. While there is considerable correlation between both indexes, neither provides information on how individual families cope with the lack of infrastructure or what further impact this has on family income. Debates about what measures should be used, or how many items should be included in existing measures, do make a difference to outcomes. The more items included in a scale, the less statistical support there is for inequality[1] (Carson and Martin 2001).

Geography is also a significant factor in both absolute and relative poverty. While Henderson recognised differences between urban and rural populations, more recent research suggests that the variation is best understood as across neighbourhoods (Carson and Martin 2001). For example, there are pockets within urban communities with high rates of poverty, sections of the farming population whose incomes have grown significantly over the last two decades, and some remote towns where the majority of incomes are high. This latter group tends to be mining towns or areas with high levels of primary production (Carson and Martin 2001). In settlements where a large group of the population are poor because of lack of access to employment there are fewer public resources such as transport, health or education services, forcing people to either go without or pay more to obtain access to them. This locational disadvantage (Carson and Martin 2001) occurs where people have to pay more to gain access to resources that would assist them to generate an income.

Clearly spatial and locational disadvantage are factors that explain poverty levels and the relative deprivation of Aboriginal groups. In the measures used by Taylor (2004) outlined below, lack of employment opportunities and distance from the nearest administrative centre are two important factors to be taken into account when measuring Aboriginal poverty.

1 For example, a simple measure of income will give a different result from a set of measures that includes education, access to services, and welfare provisions such as free health care or transport.

Using ABS data in Aboriginal contexts

If there are problems measuring socio-economic status for the mainstream Australian population this situation is compounded for Aboriginal and Torres Strait Islander communities where cultural factors raise questions about the accuracy of ABS data. Ethnographic research has identified several issues of concern, including the problem of accurately estimating population numbers for service provision, given that settlement populations may fluctuate as a result of ceremonies and funerals, sometimes increasing visitor populations by more than 100%. Even where the ABS employs and trains Aboriginal and Torres Strait Islander census collectors, as is the case for the Indigenous Enumeration Strategy (IES), the issue goes beyond the difficulties of accurately estimating population numbers to include difficulties in estimating family, household and dwelling size, numbers of nuclear families, single and married population numbers or the numbers of 'family' members dependent on any one individual's income. In a series of working papers published by the Centre for Aboriginal Economic Policy Research, Morphy (2004) argues that the problem is one of translation. Key terms and wording in the census documents, such as relative, single, married, de facto, divorce, family and household dwelling, do not take account of Aboriginal and Torres Strait Islander ways of understanding these terms. For example, a married woman may not actually live with her husband, but in a single women's camp or with her parents. Such a woman is not divorced – her contact with her husband may be shaped by his ability to provide income or the preferences of the couple at that time.

The key to appreciating the inaccuracies of ABS data for Aboriginal populations lies in differences in kinship systems (Morphy 2004). Even the Indigenous Enumeration Strategy uses Anglo-Celtic kinship terms that do not necessarily equate with Aboriginal kinship and it is presumptuous to assume that Aboriginal and Torres Strait Islander census collectors standardise their interpretations to these difficulties (Morphy 2004). There is also an assumption built into the census that nuclear families live in one household. As Morphy (2004) notes, Aboriginal people privilege lineage, not nuclear family, so that it is possible for individuals to be responsible for kin across multiple dwellings or locations. She notes that kinship is one of the abiding characteristics of Aboriginal Australia even in settled areas, where populations are presumed to be more Anglo-Celtic than traditionally orientated in their culture. As a consequence, Morphy argues that ABS census data for all Australians should focus on the size, age distribution, gender composition, and dependency structure of a household (extended household), rather than the nuclear family.

Adding to the difficulties outlined above, where there are no local census collectors, on-the-ground estimates of Aboriginal and Torres Strait Islander populations often do not equate with ABS figures. The difficulty here appears to be insufficient personnel to administer the census collection in remote settlements along with a lack of awareness of population movements between outstations and the home settlement (Martin et al. 2004). Taylor and Bell (2003) also argue that Aboriginal populations may not necessarily understand the census question about 'usual residence' if at the time of the census they happen to have moved to a near-by town for health care, or other administrative reasons. Research by Martin et al. (2004) suggests that the population group most often omitted from the census is the under-30s. They are the most mobile and socially marginal and are often unemployed (Taylor 2004). The ABS makes up for this deficiency by doing an Estimated Resident Population (ERP) count of people who are presumed to be resident for up to 6 months in any settlement. This allows for an 8% increase in the population across all age cohorts. The ERP is not a re-count at the settlement level, but is a statistical exercise employed to bring the Aboriginal and Torres Strait Islander population numbers into line with estimates. It is possible that

the ERP estimate for a particular settlement is either an under- or over-estimation of population. It is not surprising that Aboriginal leaders and settlement administrators remain concerned about the disparity between census data, ERP data and the reality of numbers resident in the settlements (Taylor 2004).

Taylor and Bell (2003) have suggested an alternative population count based on a set of composite measures. These include school enrolment, clinic registers, Medicare data, birth and death registers and Centrelink data which include CDEP and Newstart payments. In selecting data sets they argue the figures should be taken from these sources as close to the census date as possible, individuals must be able to be uniquely identified and reporting must be centralised and standardised across the state. Despite these caveats, in their re-count of settlement population numbers in Queensland they found anomalies in all five data sets, suggesting that to use any one set by itself would be unreliable. A more reliable estimate is obtained by drawing up an estimate based on a composite of all five measures. Composite estimates of population taken from these databases indicate a 17% increase on ERP numbers for the Queensland Aboriginal and Torres Strait Islander population, although this was not uniform, with some settlements having a 38% increase, while others were as low as 4%. When Taylor and Bell (2003) added Community Housing and Infrastructure Needs Survey (CHINS) data to these estimates, increases in population rose by 50% in some instances.

The differences in these estimates suggest that no one measure can be relied upon and even composite measures may under- or over-estimate population numbers in some cases. In order to go some way towards providing an answer to this question Taylor and Bell (2003) have divided communities into three types: those that are remote, where the composite and the ERP are closely aligned; communities that have been designated as Statistical Local Areas (SLAs) for some time where there is a strong alignment between ERP, census and composite data suggesting a more rigorous count; and communities near large rural towns where the ERP and composite data are similar in age cohort structure, but not in population estimates. For this last group they suggest a significant diaspora of Aboriginal and Torres Strait Islander people move between settlement and town, making estimates of the population difficult.

Measuring poverty in the Aboriginal context

This report provides a profile of four settlements in terms of the potential impact of user pays for essential services or the cost of improvements to current supplies of water. The difficulty of predicting population numbers and then accurately describing their demographic characteristics affects the utility of measures of poverty and relative deprivation for Aboriginal people.

Besides debates about relative improvements in Aboriginal poverty, a number of researchers have reported on the difficulty of measuring socio-economic status for Aboriginal and Torres Strait Islander populations, particularly those living in remote communities (Altman 2000; Taylor 2004). At first sight the task looks simple. Here is a bounded population group, usually isolated enough to separate them out from other groups, the majority of whom are on CDEP or welfare payments. It would appear to be easy to measure income and assets. However, social security and CDEP payments represent only one part of Aboriginal and Torres Strait Islanders' economic systems. Their welfare economy may be supplemented by a market economy as well as an economy based on customary activities. Altman (2000) referred to these three sources as a hybrid economy. Making definitive statements on absolute or relative poverty is problematic when the economy is complex. As with population numbers, ABS data lack the capacity to capture the hybrid nature of Aboriginal economies (Altman 2004). While Centrelink, CDEP or formal employment can be

recorded, other income, goods and services linked to hidden economies, cash transfers, or the customary economy may remain hidden. For example, communities may organise hunting or fishing trips on a regular basis in order to supplement food supplies, or family groups may engage in art and craft activities outside the formal market economy. It is difficult in such cases to make accurate assessments of family or household incomes or to understand what lies behind statistics on household or family size.

Further to this, Taylor suggested that in remote Aboriginal communities the economy is characterised by seasonally and culturally determined modes of accumulation and disbursement that differ from the way the economy operates in many non-Aboriginal communities. As he notes, ABS data on income are collected at a particular point in time when respondents are asked to indicate their 'usual income' (Taylor 2004, p. 55). This figure is then used to calculate annual income. What this approach fails to take into account is differences across the year in weekly or fortnightly income, the result of seasonal work, or, for example, delays in procuring grants for community-based projects. Nor does the census take into account how income is dispersed. In addition, some unemployed individuals may have high cultural status, which assures them income and in-kind support from employed family members. Family groups may include second and third wives in paid employment, while the first wife and husband remain unemployed, making it difficult to assess the extent of their reliance on welfare payments. It is also possible that combined family or household income is not an accurate estimate of what is available for the purchase of food or the payment of utility costs in any one household. Such assumptions presume that household expenditure is dealt with by the pooling of finances.

Generalising findings from this study to other Aboriginal communities

Given the high degree of challenge levelled at ABS data collected on Aboriginal and Torres Strait Islander demographic information, a question must be raised about how much the findings here can be generalised to other communities. What the ABS data do indicate is that Aboriginal populations living in settlements, even when they are close to larger rural towns, have higher rates of disadvantage in terms of income and employment than town-based Aboriginal populations or non-Aboriginal populations. This appears to be the case even when the settlement is within walking distance of a town, as is the case with the town camps in Alice Springs, Davenport in Port Augusta and Umoona in Coober Pedy. Sanders (2004) found that town campers tend to have demographic characteristics more in common with Aboriginal populations in remote areas. He suggests that this is probably because these fringe communities are made up of groups who have strong links with more remote communities and that there is a high degree of mobility between the two. In the case of settlements such as Davenport, they are havens from the harsher racist realities of town life. Decisions to move between town and fringe settlements may also be a simple matter of cheaper rent and overhead costs; water and electricity being two major considerations. Given these points, one can argue that Aboriginal settlements close to towns should be treated in a similar way to more remote settlements in terms of the assistance provided to meet the costs of water and electricity.

ABS data can be supplemented with additional data drawn from settlement-generated sources. Taylor (2004) makes the point that settlement-generated data contribute to capacity building within the group, especially where the local people collect the data. Data collection should be kept to a minimum and follow the logic of the group's way of organising kinship relations, households, and income distribution. This means questions dealing with family and kinship, usual residence,

household size and employment ought to reflect cultural and labour market realities. In his study of the Thamarrurr region, Taylor (2004) employed senior men and women from the various formal organisations such as the Community Council and leaders of the various clans to perform the census count. These data were then checked against administrative records held by the Thamarrurr Housing Office (Taylor 2004).

In their analysis of the 2001 Census Martin et al. 2004) suggested that questions about residence should make provision for absent family members by asking who usually lives there, but might be absent for reasons of sickness, sorry business, sports carnivals or hunting and fishing. People should be asked their address in general terms, rather than specific house or street names and numbers. This allows those who might move from dwelling to dwelling to be captured in the settlement population count. Finally, they caution against complex forms, suggesting that all items should be in plain English, on a single form and deal with only the most important census items. Clearly these items need to be compatible with other mainstream census data so that comparisons can be made with other population groups.

Conclusion

This chapter has explored emerging literature about the impact of utility prices on household poverty and some of the difficulties with providing reliable demographic data for studies that focus on Aboriginal people living in remote areas. This discussion forms the backdrop to Chapter three where the methodologies used in this study are outlined.

Chapter three: Methods used in this study

Introduction

This project focuses on strategies that aim to reduce the potential adverse impacts of the NWI on Aboriginal and Torres Strait Islander communities and enhance community wellbeing. This involves identifying strategies that are economically feasible and environmentally sustainable for each settlement in order to mitigate or reduce the increased cost of water to householders arising from the reform initiatives. The specific objectives include:

- an economic appraisal of water costs to householders in each settlement
- identification of appropriate low-cost strategies aimed at reducing service delivery costs to individual householders while simultaneously promoting water conservation, greater water use efficiency, and sustainability of water resources
- engaging the community in discussions on the levels of water service delivery that they would be willing to pay for where Aboriginal communities currently have no formal water service provider or where the community is not satisfied with its current water supply.

In order to meet these objectives a mixed methods approach was employed in the study, using both qualitative and quantitative design. Qualitative methods included focus group discussions with the communities (Willis et al. 2004) and a contingent valuation exercise at Nepabunna and Davenport. Contingent valuation is a qualitative approach to community decision making around capacity or willingness to pay, in this case, for water. Quantitative data included the cost of living analysis (after Tregenza and Tregenza 1998) and water meter readings. The cost of living analysis provided local quantitative data on absolute and relative poverty and allowed a judgement to be made on the capacity of individual communities to take on additional financial costs for essential services. This chapter begins with a brief overview of the ethics procedures complied with, followed by an outline of the methods used in the study.

Ethical considerations

Prior to the commencement of this study, ethics clearance was obtained from the Flinders University Social and Behavioural Research Ethics Committee and the Aboriginal Health Council (AHC) of South Australia. Both organisations require research with Aboriginal groups to comply with National Health and Medical Research Council (NHMRC) *Guidelines for Ethical Research with Indigenous peoples*. Both ethics committees also requested written confirmation from the four communities that they were willing to be involved in the project. This was provided once individual communities were identified by the funding agencies and the communities agreed to participate. Funding for the research was gained from AARD, FACSIA, the Cooperative Research Centre for Aboriginal Health (CRCAH) and the Desert Knowledge Cooperative Research Centre (DKCRC). United Water contributed seeding money. Selection of three of the communities was determined through discussion with the funding bodies: AARD recommended Nepabunna and Davenport as both communities were covered by the Commonwealth-State Bilateral Agreement on Essential Services; FACSIA suggested Yarilena, a homeland settlement close to Ceduna; Scotdesco was incorporated into the study as it is situated close to Yarilena and is a similar kind of settlement. Nepabunna and Yarilena were formally contacted by the relevant funding agencies with a request to be involved in the research. The research team contacted Davenport and Scotdesco directly.

The study ran on a rolling basis with the Nepabunna timeframe extending from September 2005 to September 2006; Yarilena settlement was involved in the project from December 2005 to December 2006; Scotdesco's engagement extended from May 2005 to December 2006; and Davenport joined the project in May 2006 through to April 2007. Preliminary reports on each settlement were provided to the relevant funding agencies at the appropriate dates.

An Aboriginal reference group was established to provide a forum for discussion, accountability and guidance for the research team (Appendix 3). The reference group included Alwin Chong (AHC), Alwyn McKenzie (AARD, Premier and Cabinet), Sharon Meagher (AARD), Jason Downes (PIRSA), David Singh, Chris Rains and John Chester (ALT). The reference group met six times over the life of the project. The research team also met quarterly with the funding agencies: AARD, FACSIA, and United Water, and provided three-monthly reports to the DKCRC and the CRCAH. In all cases these reports provided an outline of the research tasks completed, but no data from individual communities was provided to the funding agencies until the community had signed off on the final report.

Don't forget the plumber!

A key ingredient in ethical research with Aboriginal people is to immediately address the problem under investigation as well as collect data on the incidence of the issue. Miller and Rainow (1997) refer to this as 'don't forget the plumber', alluding to their own research where they surveyed the state of repair of health hardware such as baths, showers and washing machines in houses on the Anangu Pitjantjatjara Yankunytjatjara Lands. In their study a plumber accompanied them with the task of immediately repairing all faulty taps, leaks or pipes surveyed. The principle here is that (Aboriginal) people appreciate an effort by researchers to provide an immediate return for their cooperation. In the current study, examples include employing local Aboriginal residents to collect the data, paying residents a sitting fee to attend focus groups, and the preparation of Community Water Grants with two communities, one of which was successful. However, the most pertinent outcome for this research project is for each community to reap the benefits associated with either more efficient water use or lower household expenditure on water services.

Research methods

The three data generating methods used in this study are contingent valuation (Carson et al. 1999), an audit of water use, and a cost of living analysis (Tregenza and Tregenza 1998). The processes are outlined below.

Contingent valuation

In many communities, the proportion of income spent on water and electricity utilities is not known. Before a user pays system is introduced, it should be understood whether hardship would increase as a result. Some Aboriginal communities want a reliable and secure water supply that meets the Australian Drinking Water Guidelines (ADWG), provided through a formal water service provider (such as SA Water). Double-bounded (iterative bidding) contingent valuation (CV) was used within the semi-structured face-to-face focus-group framework to determine willingness to pay for water services. The details of the CV methodology (based on Bateman and Turner 1993; Carson et al. 1999) implemented by the research team is as follows:

(a) Prior to conducting the survey participants were provided with background information, an explanation of the purpose of the project, and the aim of the CV questioning. Participants were informed that the questions related to a hypothetical (but realistic) future scenario. For example,

if, in the future, they wished to receive a 'formally managed' water supply from SA Water that met safe drinking water guidelines, participants were asked 'How much would you be willing to pay to gain access to that water service?' It is a hypothetical question in that no such arrangements are tabled, yet it is a realistic scenario if both parties want the same outcome. With lobbying for funding such a service arrangement might be negotiated.

(b) Participants were provided with a detailed description of a hypothetical water supply option and a summary fact sheet (Appendix 4). The community then discussed the nature of the water supply that they might be willing to pay for, if it was an improvement on their current water supply in quality, quantity and reliability. In all the scenarios the supply options proposed to the community fell within the local environmental constraints (climate and water resource availability), and the attainment of supply was sustainable and feasible.

(c) Participants were provided with a detailed description of the institutional setting in which a water supply option would be provided. Again, this was discussed with the community so that they could decide on the type of institutional arrangements that they preferred. For example, the community might decide to ask SA Water to provide the service, with each household receiving a fully maintained water supply to the household boundary, using individual household meters, and with each household receiving montly individual bill for water use with a tiered tariff system.

(d) Participants were provided with a description of how the service might be paid for. For example, an automatic monthly debit of the full sum from a personal bank account or by the Community Council collecting a small amount each week.

(e) Participants were asked a series of questions aimed at determining how much they would be willing to pay for various levels of service (using the double-bound elicitation method of Bateman and Turner 1993). For example, one might begin by stating that in Adelaide in 2004 people used on average 268 litres of water per person per day (L/p/d). Extrapolating this amount to the median Aboriginal household size in South Australia (3.3 people) yields around 884 L per household per day. Water is charged at $0.96/kL so this would give an average water bill of around $6.75 per household per week. Based on this calculation participants could be asked 'To receive the same level of water quality and water service delivery as people in Adelaide receive would you be prepared to pay $6.75 per week?' If respondents reply 'no', one then enters a bidding game, i.e. one then asks 'If you were prepared to use half that amount of water would you be prepared to pay $3 per household per week?' It may be that the level of service in a remote settlement is perceived to be 'half as good' as the service and quality in Adelaide and therefore participants may be asked 'Would you be prepared to pay half of what the people in Adelaide pay for water?' This iterative bidding (double-bounded) line of questioning means that the sum identified in the willingness to pay questions is scaled down until an amount is agreed upon (that amount may be zero). Zero amounts may be given after a considered and careful response where the participant feels they cannot pay any amount for the service. Zero amounts may also be given as a 'protest vote' when participants refuse to state any willingness to pay.

(f) Participants were asked informal debriefing questions so the researchers could better understand the context and meaning of their responses.

(g) The results were interpreted with reference to the demographic data gathered in the cost of living study.

Adapting the contingent valuation approach

Some modifications were made to the CV process given that only one settlement in the study was not paying for water, and that mechanisms are in place for communities to apply for funding for minor capital works through Commonwealth Community Water Grants. The CV exercise focused on the question of the community's willingness to pay for additional technology that would add value to the existing supplies in terms of quality and sustainability and to meet the requirements of the NWI. Participants were presented with three to four scenarios that outlined the cost, and were asked about their willingness to pay for a fraction of the full cost. Where possible the deliberations of other communities were discussed with the group. The alternative sustainable technologies were presented both orally and visually using diagrams that mapped the technology in the settlement (Appendix 4). During the bidding process it was possible for the community to select a hybrid of the scenarios, and equally possible for them to select technologies that they would like to see installed in their settlement, but were not willing to pay for. In one instance prior to the CV process, the community was clear on what improvements they wished to install. The researchers costed the installation for this settlement and helped the community prepare a Community Water Grant application, which, as noted above, was successful.

A major limitation to CV as a rationale for providing services to Aboriginal people is the incorporation of the concept of paying for a future development. While the implementation of policies and service agreements incorporating 'mutual obligation' is now familiar to most Aboriginal groups, the uncertainty of service provision following the closure of ATSIC and the incorporation of CDEP contracts and Aboriginal Housing into mainstream departments has made some Aboriginal communities suspicious of development agreements. This research occurred at a time (2005–2007) when the lines of communication, responsibilities and roles were still being defined between those federal and state government departments that had assumed responsibility for Aboriginal services and the Aboriginal communities and their agents. As a consequence, it is possible that this uncertainty influenced some of the Aboriginal participants' responses to the CV exercise.

Water use audit

Settlement water use data were required for a number of reasons. Firstly, there was a lack of information on actual domestic and other water use in remote settlements. In some settlements water use is unmetered, and in others the meters are not read, although they exist. Under the former DAARE water meters were installed in all 18 settlements, but whether they are read or not is up to the local Community Council. In some settlements residents were not aware that they had water meters in their houses. Compounding the uncertainty due to this lack of data are the conflicting anecdotal reports of a water conservation ethic on one hand, and possible infrastructure leaks and wasteful water use behaviour by children on the other (Willis et al. 2004).

The second reason for collecting water meter readings was to determine whether water *was* being wasted. A knowledge of household water use together with the corresponding number of occupants enabled actual daily per capita water use to be calculated. Water use by various other activities can also be monitored by recording the water use of settlement buildings including the administration offices and a visitor centre. These data enabled comparisons to be made between towns and regions. The settlement-based meter readings were also compared with gross water use data to identify possible subterranean leaks from the reticulation infrastructure or other unaccounted losses from the system. For Nepabunna, water meter readings were compared with groundwater pumping rates from its two bores which were measured by the Department of Water, Land and Biodiversity

Conservation (DWLBC). At Yarilena and Davenport, meter readings from individual buildings were compared with readings on the mains water supply system at the settlement gate. Thirdly, it is necessary to have an understanding of where or when most water is being used in order to identify strategies or technologies where water savings can be made.

Community members formed part of the research data collection team to read household water meters. With the exception of Scotdesco, each settlement had readings taken over a period of one year in a series of intensive four- to six-week periods. They were taken at different times throughout the year to show seasonal water use trends. Where possible, readings were taken on a Monday and Friday of each week during the intensive monitoring periods to show weekday and weekend trends. Water use patterns during the 'interval periods' between the intensive measurements were obtained by comparing the meter readings on the last day of an intensive monitoring period with the reading on the first day of the next intensive monitoring period. The staff were also asked to record population data at each house (usual residents, number of visitors, number of residents absent), as well as other noteworthy comments (e.g. known leaks, evaporative coolers switched on).

Calculation of the amount of rainwater that could potentially be harvested from roofs

At each settlement the amount of rainwater that could potentially be collected from roofs was determined using the equation given in Australian Government (2004):

> A x (rainfall – B) x roof area = rainwater runoff (L)
>
> Where A is the efficiency of collection from a roof surface, with values of 80–85% efficiency.
>
> B is the loss of rainwater associated with the wetting of roof surfaces and absorption, with a value of 2 mm per month totalling 24 mm over the year (Australian Government 2004).

In all calculations an efficiency of 85% was used; long-term rainfall data were accessed from the Bureau of Meteorology, and data on the roof areas were provided by the respective settlements. The amount of rainwater that could potentially be harvested was then compared with the storage capacity available (rainwater tanks) to give an indication of the scope to supplement the water supplies through additional rainwater harvesting.

The cost of living study

The Tregenza and Tregenza (1998) method is similar in approach to other studies undertaken across Australia to ascertain the relative cost of food for Australian families living in rural and remote areas (Leonard et al. 1997; Meedeniya et al. 2000). The study by Leonard et al. (1997) in Queensland compared fortnightly costs of a food basket in a variety of rural and remote locations for a hypothetical family of six, composed of one pensioner, two unemployed adults and three children aged 4, 8 and 14, with the cost of the same items for a family in similar employment circumstances living in Brisbane. The hypothetical family was not seen as an average rural/remote family, but was constructed to allow for appropriate calculation of food quantities across a range of age groups living in Australian households. In the Meedeniya et al. (2000) study conducted in rural and remote South Australia in 1999, the food basket used was based on the *Australian Guidelines to Healthy Eating* (Smith et al. 1998) and met the National Health and Medical Research Council (NHMRC 1991) recommended dietary intake for Australians. The food items costed in remote and rural areas were the cheapest, non-generic brands (Meedeniya et al. 2000), and focused on quality and availability as well as the percentage increase in costs. In this study, to calculate the

percentage mark up of prices in remote settlements in comparison to prices in Adelaide, the price in Adelaide is taken as the benchmark value. That is, the difference in the price of an item in a remote settlement compared to the price in Adelaide is divided by the Adelaide price to give the percentage mark up.

Three modifications to this approach have been made in this study. First, the hypothetical family constructed for each settlement approximates the mean. This has been done to provide a more reliable assessment of the community's capacity to take on additional costs. Second, the food basket compiled for each settlement represents what the women said they actually purchased for their families. While in most cases it approximates the *Australian Guidelines to Healthy Eating* (Smith et al. 1998) there are some variations depending on the community's capacity to access particular food items, such as fish or meat. The food calculations from the Smith et al. (1998) study based on the NHMRC guidelines were used as the guide. The third modification deals with the costing of supermarket items. In many cases generic brands were costed rather than the non-generic brands.

Quantities in the shopping lists are guided by the serve sizes used in the *Australian Guide to Healthy Eating* (AGHE) as outlined in Table 3.1, and modified according to what people in the communities stated they ate. The calculations used are listed in Table 3.2. For example, while the AGHE specifies that adults should eat three medium-sized serve of fruit per day, and children should have two, people in one settlement stated that each person would eat approximately three pieces of fruit per week. Similarly, in one settlement it was reported that people ate more meat and tinned baked beans and spaghetti than specified by the AGHE (Smith et al 1998). These differences are partially a result of locational disadvantage, where access to shops is limited due to distance. They may also be linked to a diet based more on meat and carbohydrate due to people being historically involved in work outdoors on pastoral properties.

Where the Leonard et al. (1997) and the Meedeniya et al. (2000) studies deal with estimating the relative mark-up of food for rural and remote families, Tregenza and Tregenza (1998) take their analysis one step further and incorporate the cost of health consumables and health hardware into the equation. Their methodology includes:

1. construction of a hypothetical family for the communities under investigation
2. calculation of the income for the hypothetical family less community deductions such as rent
3. creation of a typical store box containing a weekly menu of food and other health consumable and hardware items
4. a survey of the price of items from the weekly list in the local store
5. a comparison of the costs of these items with Alice Springs supermarkets
6. an estimation of the percentage of income left to the family or household group.

Table 3.1: Australian Guide to Healthy Eating (AGHE) sample serve sizes of the five food groups

One serve of bread or cereal = 2 slices bread or	Cup cooked rice, pasta, noodles or 1 cup cooked porridge or ½ cups of muesli
1 serve vegetables = ½ cup cooked vegetables or	Cup salad or 1 potato or ½ cup peas, lentils or beans
1 serve fruit = ½ cup juice or	1½ tablespoons sultanas or 2 small pieces fruit or 1 large piece fruit
1 serve dairy = 1 cup milk or	2 slices cheese or 200g yoghurt or 1 cup custard
1 serve meat/ eggs/nuts/legumes = ½ cup mince or	65–100 g cooked meat or 2 slices roast meat or ½ cup cooked dried beans or 2 small eggs or 80–120g cooked fish fillet or 1/3 cup peanuts or almonds or ¼ cup sunflower or sesame seeds

Table 3.2: Approximate quantities of the five food groups recommended by the AGHE

Approximate daily serves	Bread and cereals	Vegetables	Fruit	Dairy	Meat/eggs/nuts
Child	8	5	2	3	1
Woman	5	5	3	2	1.5
Man	8	6	3	2	1.5
Total daily serves	21	16	8	7	4

Note: For for a hypothetical family of two adults and one child under 15 years of age

By incorporating health consumables and hardware the authors are able to make informed commentary on the capacity of community members to maintain health and wellbeing and pay for additional services.

Tregenza and Tregenza (1998) argued that the rationale for using the healthy hardware practices as the basis for their study arose from the difficulty of drawing on previous economic research to illustrate the impact of user pays on the health and welfare of Anangu. Studies carried out in 1993/1994 by the SA Centre for Economic Studies incorporated the total income for the APY Lands, including grants and community resources such as schools, clinics and stores. While community-based grants are additional income, individuals do not necessarily have access to this money for daily living, although they may enjoy the resources that come from a community bus or swimming pool. Further, resources such as clinics and schools on-site are part of the economic capital of the group, but they do not directly contribute to family income, although it must be recognised that they reduce the costs of education and health care. The focus of the Tregenza and Tregenza (1998) study was on the disposable income of families and on the broader capacity of each family to provide for their health and wellbeing.

Ascertaining reliable data for the cost of living analysis

For this aspect of the study we sought three forms of data: census data available in the public domain or upon request from Australian Bureau Statistics (ABS), additional statistical data available from National Aboriginal Health Strategy (NAHS), R3 Project Impact Assessment 2005 data sets (Parson Brinckerhoff 2005) and community-generated data. The community-generated data was collected as part of the research process and included information on population, income and employment characteristics, the customary economy, and costs related to the remoteness of the settlement. This included such things as the cost of a car, which is necessary for shopping, and the costs associated with a car. A major difficulty of data collection for this study was the relatively small size of the population in each of the four settlements in relation to ABS collection districts. In each case the ABS did not provide detailed community data, as confidentiality would have been transgressed due to the low populations. Likewise, collection of sensitive data on household income from settlements where it would be possible to identify individuals was a major motivating factor in our use of the cost of living analysis.

It is important to point out that the ABS has an ongoing commitment to improve the quality and comprehensiveness of Aboriginal and Torres Strait Islander data as demonstrated by the implementation of initiatives such as the Indigenous Enumeration Strategy. However, at present census data about Aboriginal and Torres Strait Islander people are best seen as 'ballpark' figures only and the ABS emphasises the importance of using the data with caution. For example, in guidelines developed to assist people in making use of census data about Aboriginal and Torres Strait Islander Australians the ABS does not present census counts of Aboriginal and Torres Strait Islander people as the best estimates of the size of the population but rather as a starting point to determine estimates (Ross 1999, p. 59).

The experience of researchers in this study supports the value of using Aboriginal and Torres Strait Islander census data with caution. For example, initial examination of figures relating to the median weekly family income in various Aboriginal and Torres Strait Islander locations relevant to this study raised questions which required some clarification with the ABS before the data could be included in this report. As a result of our queries, the ABS provided revised family income data for two Aboriginal and Torres Strait Islander locations. This highlights the importance of researchers not accepting the data at face value until any anomalies have been satisfactorily explained through consultation with the ABS.

Data used to describe settlements

Each settlement is described in the following terms:

- ABS Statistical Local Areas, Local Government Areas, Indigenous Areas and Locations and Electorate
- ABS data on population, age composition, gender, CDEP and other forms of employment, labour force rates, and annual and weekly income
- ABS 2001 data on income from unemployment and welfare payments
- ABS 2001 data on income bands in relation to nearest rural town population of Aboriginal and non-Aboriginal populations
- ABS 2001 data on the number of dwellings, household size and household dependency.

Additional data from NAHS R3 Project Impact Assessment 2005 (Parsons Brinckerhoff 2005), while incomplete was used to supplement the ABS data and included:

- NAHS 2005 population data per community
- NAHS 2005 employment data
- NAHS 2005 data on the number of dwellings and household size.

Community focus group data included:

- the service population, including population fluctuations, age composition, gender, CDEP and other forms of employment
- information on the customary economy
- data on the cost of living in the settlement with specific reference to costs associated with the purchase of food, medical care, health hardware items and travel.

It should be noted that the three data sets are taken from different time periods: ABS 2001, NAHS 2005, and focus groups 2005 through to 2007 which introduces increased variability into the calculations with the data. One solution to this was to request permission from each community to obtain access to Centrelink and/or clinic data. This was not pursued because it was assumed communities would find this an invasion of their privacy. Even generating the cost of living data was seen by some participants as a sensitive exercise, although they could also see the value in having this information for other projects in which they were engaged.

The research process

The initial settlement visit

The communities were visited three or four times by the same two members of the research team: Pearce and Willis (Nepabunna), Pearce and Ryan (Yarilena and Scotdesco), Pearce and Wadham (Davenport). Communication between visits was maintained through numerous newsletters.
The first visit established the community's willingness and interest in the research, the ethical principles governing the project and the purpose of the planned three visits. This visit included an explanation of the aims and objectives of the study, sought permission to tape the focus group discussions, and completed the ethics-related paperwork (Appendix 5). During this visit the community was introduced to the NWI recommendation that state governments should implement full cost recovery, and to the various processes being used around the country to conserve water. The initial focus group discussion was in two parts.

In the first part the participants were asked to brainstorm possible water sustainability solutions suitable for their settlement so that the research team could investigate them prior to a return visit. At this point a plan was put in place to engage a community member as a research assistant to collect water meter readings. The research assistant was required to record the house number, date, water meter reading and number of occupants, for individual household dwellings as well as community buildings. The settlement-based research assistant faxed or posted the data to the research team at Flinders University at the end of each six-week period. This data provided base-line information on water use which could be used in future studies to gauge the impact of water saving technologies, if they are implemented.

In the second part of the discussion the focus group members were shown 2001 ABS data on their community that included population, age distribution, family size, gender, household, individual and family income, rent, number of dwellings, employment status and relative poverty in relation to the nearest rural town population of Aboriginal and non-Aboriginal people. Discussion was held

with the community on the reliability of the data given possible changes that might have occurred in the ensuing five years. A plan was then put in place to update the data. The purpose of the data was outlined to the group as assisting in the construction of a hypothetical family specific to their community in order to, at a later date, work out the cost of living. Copies of the Tregenza and Tregenza (1998) cost of living analysis were provided to each participant to familiarise them with the process and possible uses of the data. This document explains the research process in a clear manner through the use of drawings and diagrams. In all cases the research team read through the documents during the focus group discussions to assist those with limited literacy or poor eyesight.

The hypothetical family for each community was constructed from the updated data provided by the community and by comparing these data with NAHS and ABS data. It was based on calculating the mean family size and composition and the most common form of employment. Across the four communities the majority of individuals (over 70%) were employed on CDEP projects and this was used to calculate family income. We did not use the classical hypothetical family of six (two adults, three children and one pensioner) in this study, but constructed an appropriate hypothetical family for each community in the interest of representing their case more accurately.

Data collection

The second and sometimes third trips to each settlement involved focus group discussions using the contingent valuation method, confirming our construction of a hypothetical family and income, and working with the women to identify a weekly menu and the cost of health consumables and hardware (Tregenza and Tregenza 1998).

The contingent valuation study provided each community with options for sustainable technology. Communities were presented with at least three options. These options were based on previous research conducted at the settlement; the issues raised during the first field visit; advice sought from AARD, SA Water, FACSIA and United Water on government policy; strategic plans; and the state of current technology.

The food items identified during this visit were costed at the nearest supermarket to the settlement. In the case of health hardware, items were costed at the town identified by community members as their preferred option, even if it was several hundred kilometres away. The prices of all food, health consumables and heath hardware were compared with prices in Adelaide at a time as soon as possible after that date in order to calculate the percentage difference.

Household expenditure was based on the income of two adults per household, except where CDEP data from the 2001 ABS Census plus updated data provided evidence to the contrary. For example, if the number employed on CDEP indicated few women were earning a wage, income was calculated using only the male wage. Focus group discussions indicated that assumptions about all adult family members ‘chucking in’ money for weekly food and other household costs cannot be verified.

Community verification of the report

The focus of the final field trip was to negotiate community acceptance of the report. Drafts of the report were sent to the community in advance of the visit to give participants time to read and reflect upon the report. During the field visit the research team made a formal presentation of the report consistent with the written version. The research team worked through the report with the community, making the appropriate modifications to ensure they were happy with the final account.

Settlement characteristics

The four settlements have a number of characteristics that need comment. All four are characterised by high levels of CDEP employment and low numbers of resident non-Aboriginal staff, although Nepabunna employs a part-time office administrator. All four are in desert regions with little opportunity to access the customary economy given the environmental limitations. As a consequence we have not calculated hunting activities into weekly incomes, although it exists in at least three of the four settlements. None of the four has its own store. In all cases settlement residents are obliged to shop at the nearest town. In the case of Nepabunna and Scotdesco the nearest town is some distance away, making petrol costs a significant expense. Two settlements, Davenport and Nepabunna, came under Aboriginal Affairs and Reconciliation Division (AARD) responsibility through the Commonwealth-State Bilateral Agreement on Essential Services while Yarilena and Scotdesco are settlements which were the responsibility of the Commonwealth Department of Families, Community Services and Indigenous Affairs (FACSIA) during the research period.

Limitations of the study

The study is limited by the fact that settlement-based data were not independently checked. This includes both the data collected for the cost of living study as well as the water meter readings. The difficulties associated with this become evident where expenditure is more than income. This suggests that the costs, particularly for food, are overly generous and that individuals and families would not spend as much on food as we have estimated. This methodological error probably arises from having a group of women in the settlement compile the weekly menu for their own family, not the hypothetical family. The data were presented at the final visit to each settlement, at a meeting where several community members were present, and no objections were forthcoming for the figures or analysis, but of course an objection is only likely to arise from a family similarly placed to the hypothetical family, and there may well be some shame in doing so. The strength of the cost of living analysis is that it is an estimation of what a group of people in the designated settlement say they spend and what they eat. It is not an account of what they should eat, nor is it an accurate estimation of what the hypothetical family spends on food.

We have already noted that none of the settlements in this study has a store, although all communities seemed to access book-up facilities in the nearest town, and during interactions with community members in local stores we noted some had credit cards. While we did note stores that provided book-up services to the local Aboriginal community we did not seek information on whether or not individuals had their cheques sent directly to the store or not, because of the invasiveness of such a question. This practice is not necessarily a negative aspect of Aboriginal engagement in the market economy. As Altman et al. (2002) suggest it does provide people with credit where they are otherwise ineligible for this privilege. This study did not explore budgeting capacity or banking facilities with individual communities. Altman et al. (2002) have noted that the shift to electronic banking may have disadvantaged Aboriginal community members given that few have on-site banks and people tend to prefer fact-to-face interactions.

Conclusion

This study used a qualitative and quantitative approach to the research questions. The two qualitative methods were focus group discussions on the cost of living and the contingent valuation analysis where community members were asked to reflect on whether they were willing to pay for a range of alternative water saving technologies suited to their settlement. Quantitative data were collected on settlement and individual household use of water over a twelve-month period. The data will provide baseline information to any future research projects following installation of the proposed technologies. Quantitative data on the cost of living will provide policy makers with guidance on the impact of any increases in water costs. Detailed analyses for each of the settlements are outlined in the following chapters.

Chapter four: Cost of living at Nepabunna

Introduction

The key component of the contingent valuation study is to assess the community's willingness to pay for improvements in essential services such as water supply. A primary contributor underlying willingness to pay for water is the householder's capacity to pay. Other considerations include knowledge of the importance of the quality of water to the health and wellbeing of users, and in the Australian context, the need for a sustainable supply. With this in mind the research team sought data that provided information on the percentage of income the Aboriginal communities spent on essential food and health hardware items. These data were seen as a pre-requisite to understanding community decision making about their willingness to pay for infrastructure improvements, and to inform policy makers about the implications of the implementation of the NWI move to full cost recovery. Settlements where the majority of the population are on low incomes and the water supply, while sub-optimal, is adequate will be hesitant to take on additional costs. The method used to determine capacity to pay (even a minimum amount) for improvements in essential water supplies was the cost of living analysis (Tregenza and Tregenza 1998) as outlined in Chapter three.

Construction of a hypothetical family

The generation of a reliable hypothetical family for Nepabunna required access to data on population, income, employment, family and household size. The data sources used in this study were the 2001 Australian Census published by the ABS (2002), data from the National Aboriginal Health Strategy R3 Project Impact Assessment (Parsons Brinckerhoff 2005) and data gathered during this study as part of the water audit and focus group discussions. The period of data collection was September 2005–October 2006.

Nepabunna population

In terms of the ABS Australian Indigenous Geographical Classification, Nepabunna is one of seven Indigenous Locations (ILOCs) which make up the Indigenous Area (IARE) known as South Australia north-east, namely Quorn, Port Pirie, Leigh Creek and Copley, Marree, Nepabunna, Oodnadatta, and South Australia north-east remainder. At the time of the 2001 ABS Census, the population of Nepabunna was 53 people, with 85% (45) of these identified as Aboriginal and the remaining 15% (8) as non-Aboriginal. At the time the community comprised slightly more males than females (30 males, 23 females).

Population estimates for the settlement of Nepabunna were also derived from alternative sources. Data relating to water usage in the settlement were collected by the Essential Services Officer (ESO), Mr Kelvin Johnson, as part of this research project. This provided a record of the number of people per house, including fluctuations in daily and weekly population numbers. Collation of these figures generated a population of between 46 and 64 depending on the time of the week and season. In contrast, data from the NAHS R3 Project Impact Assessment 2005 (site visited 21 September 2005) reports a population of 63. Data collected in the water use study (Chapter five) gives a population of 64. This highlights the varying population estimates that can be derived from different sources. During the second visit to Nepabunna by the research team, the women who were interviewed identified, by name, 64 Aboriginal residents living in seventeen houses. There were more males than females.

Table 4.1: Population of Nepabunna at the time of the 2001 ABS Census

Aboriginal			Non-Aboriginal			Total		
Male	Female	Total	Male	Female	Total	Male	Female	Total
25	20	45	5	3	8	30	23	53

Source: ABS 2002

Age composition

Figure 4.1 highlights several features relating to the age composition of the Aboriginal population of Nepabunna. According to ABS population data there are no children between the ages of 0–9 years nor are there any community members over the age of 65 years. Secondly, the pattern of distribution of males and females throughout the different age brackets is quite different. More males than females are represented in younger age groups but are then not evident beyond the 35–39 age bracket. In contrast, females are represented in a broader range of age brackets spanning 15–64 years and at a consistent level with the exception of the 35–39 year age bracket where numbers peak. The median age for Aboriginal people is 33, a figure which is significantly lower than the median age of 52 for non-Aboriginal people for the whole of Australia.

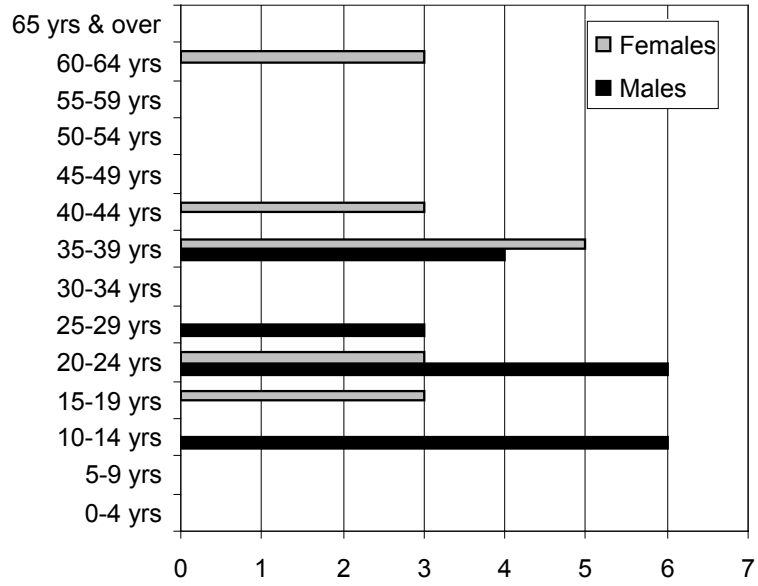

Figure 4.1: Age composition of the Aboriginal population of Nepabunna.

Note: 2001ABS Census data for Nepabunna presents ages for 36 Aboriginal people only and not the total population of 45 as shown in Table 4.1.

Data were not gathered on the age of residents at Nepabunna, although estimates of the ratio of adults to children were collected. In interviews the women identified 49 adults, ten children under the age of 15 and five teenagers (defined as those under the age of 20 as of May 2006). The fifteen children and teenagers are distributed between eight households, with nine households composed of adults only. Four of the teenagers are males. The difference between the 2001 ABS figures and those gathered in 2005 is the result of families with children returning to Nepabunna, including children returning to live with a relative such as a grandparent. In these cases the custodial parent is dependent on their pension.

Household size

The 2001 Census (ABS 2002) indicated that the mean household size for the Aboriginal population of Nepabunna was 3.5. NAHS do not provide data on household size for Nepabunna; however, data from the water audit and focus group sessions with settlement residents indicate the average household was around 2.8–3.2 people, while the median was between 3.0–3.5. Households ranged from 1–6 people per household for the Aboriginal population. On the basis of these calculations the hypothetical family was set at two adults and one child under the age of fifteen. Table 4.2 provides data on the household size. There is an argument for constructing an additional hypothetical family of 3–4 adults with no children. We have not done this because of the mobility of adult children in such households.

Calculation of the income of a hypothetical family

Employment opportunities at Nepabunna

Employment opportunities for Aboriginal people at Nepabunna are generated predominantly by the Community Development Employment Program (CDEP). Table 4.3 shows that 86% (18) of the Aboriginal labour force were participants in CDEP at the time of the 2001 Census, while 14% (3) were employed in other areas. Non-Aboriginal people were employed wholly in other areas.

Using figures from Table 4.3, labour force status for the population aged 15 years and over is presented in Table 4.4. In this instance, the total population aged over 15 years consists of the sum of the total number in the labour force and the total number not in the labour force. The continuing reliance on CDEP is shown in data from the NAHS R3 Project Impact Assessment 2005 which indicated that there were 16 CDEP participants in the settlement engaged in activities related to revegetation programs, general settlement maintenance, and a native foods venture. Focus group interviews with community members indicates a further 22 people rely on CDEP and pension payments. Of these, six are women and 16 are male; this includes the four males in the 15–19 years age group.

Income derived from CDEP at Nepabunna

Key sources of income in Nepabunna are wages derived from CDEP or mainstream forms of work, and Centrelink benefit payments. Table 4.5 provides a comparison of the median weekly income at the level of the individual and family for Nepabunna and the other Indigenous Locations within the same Indigenous Area. Based on the ABS 2001 Census, the data shown relate specifically to gross income derived from sources such as wages, salary, pensions, unemployment benefits, family allowances, student allowances and maintenance. Family income is made up of the sum of individual incomes of each resident family member aged 15 years and over who is present in the household on Census night. Family income is not applicable to non-family households, such as group households or lone person households, or to people in non-private dwellings. The 2001 ABS Census figures provide a reasonable indication of the level of family income for this study which focuses on calculating the weekly family income for a hypothetical family.

Table 4.2: Household size at Nepabunna, May 2006

Household	Adults	Children	Teenager
1	2	0	0
2	1	2	0
3	1	0	2
4	6	0	0
5	2	0	0
6	2	3	0
7	3	0	0
8	4	1	1
9	2	1	0
10	3	0	0
11	1	1	1
12	0	0	0
13	2	0	0
14	5	0	0
15	2	2	0
16	0	0	0
17	1	0	0
18	4	0	1
19	1	0	0
20	2	0	0
21	5	0	0
22	0	0	0
23	0	0	0
Total	**49**	**10**	**5**

Table 4.3: Employment in Nepabunna

Employment	Aboriginal			Non-Aboriginal			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Employed CDEP	14	4	18	0	0	0	14	4	18
Employed other	3	0	3	3	3	6	6	3	9
Total labour force	17	4	21	3	3	6	20	7	27
Not in the labour force	3	10	13	0	3	3	3	13	16
Unemployment rate	0	0	0	0	0	0	0	0	0

Source: ABS 2002

Table 4.4: Labour force status for residents of Nepabunna

	Employment/ population ratio		Unemployment rate	Proportion not in the labour force	Total 15+	
	CDEP %	Other %	%	%	%	No
Aboriginal	53	9	0	38	100	34
Non-Aboriginal	0	100	0	0	100	6

Source: McCarthy 2005

At the individual median weekly income level, Nepabunna ($160–$199) was the same as Port Pirie and Marree ($160–$199) but it falls below the communities of Quorn ($200–$299), Oodnadatta ($200–$299), Leigh Creek, Copley ($300–$399), and SA north-east remainder ($200–$299). In Port Augusta, the closest major service centre to Nepabunna, the median weekly income for Aboriginal people is also $200–$299. At the family income level, the median weekly income for Nepabunna is $500–$599. The other Indigenous Locations in the same Indigenous Area and Port Pirie had the same weekly family income, while SA north-east remote, Leigh Creek and Copley

were higher at $600–$699. Quorn and Oodnadatta have lower family incomes of $400–$499. House rental charges, one of the primary ongoing expenses to be deducted from income, are also shown in Table 4.5. According to ABS data, the rent paid by Aboriginal people at Nepabunna falls at the lower end of the scale ($1–$49), which is reasonable given their lower income levels.

Table 4.5: Median weekly income for Indigenous Locations in SA north-east Indigenous area

Indigenous Location	Median weekly individual income $		Median weekly family income $		Median weekly rent $	
	Aboriginal	Non-Aboriginal	Aboriginal	Non-Aboriginal	Aboriginal	Non-Aboriginal
Nepabunna	160–199	160–199	500–599	n.a.	1–49	n.a.
Quorn	200–299	200–299	400–499	600–699	50–99	50–99
Port Pirie	160–199	200–299	500–599	600–699	100–149	50–99
Leigh Creek and Copley	300–399	600–699	600–699	1,200–1,499	50–99	1–49
Marree	160–199	300–399	700–799	300–399	50–99	1–49
Oodnadatta	200–299	400–499	400–499	1,200–1,499	1–49	1–49
SA north-east rem.	200–299	300–399	600–699	700–799	50–99	50–99

Source: ABS 2002

The customary economy at Nepabunna

Some Nepabunna residents supplemented their income through fortnightly hunting trips for kangaroo and other native animals (Willis et al. 2004). However, we have not calculated either the cost of hunting trips or the impact of access to 'free' meat on family food costs, because of the variable nature of this aspect of the customary economy, and because savings are cancelled out by the high cost of petrol, and the need for a gun licence. There do not appear to be many opportunities to generate additional income at Nepabunna. The settlement has a bush garden, but output is limited by the low rainfall. The community does operate a tourist program, but income from this does not go to individuals, rather it is allocated to settlement-based improvement programs. The prospect for increased tourist activities is limited because the Nepabunna settlement is not on the main Marree–Oodnadatta road, and services are already provided by Iga Warta settlement, only 5 kilometres from Nepabunna.

The hypothetical family income

Given the population, household size, age structure of the children at Nepabunna and the employment characteristics of the adults, the composition of the hypothetical family in Nepabunna is two adults, one deriving income from CDEP wages, and one child aged under 15 years. Calculations for the hypothetical families used CDEP rates as outlined in the CDEP Guidelines 2005–06 and Centrelink payment rates from the Guide to Australian Government Payments (20 March to 30 June 2006). As Nepabunna falls within the Australian Taxation Office Special Zone B each person also receives a remote area allowance.

As shown in Table 4.6, the total income received by the hypothetical family is $552.82. In comparison, the poverty line for a couple with one child aged under 15 years who are solely reliant on welfare payments for income is calculated to be $536.19 for the same period (June quarter 2006), so the hypothetical Nepabunna family receives $16.63 per week above the poverty line but is still within the definition of poverty (Melbourne Institute of Applied Economic and Social Research 2006).

Table 4.6: Weekly income of the hypothetical family at Nepabunna

CDEP	$229.00 x 1	$229.00
CDEP supplement	$10.40 x 1	$10.40
Parenting payment	$185.25 x 1	$185.25
Family tax benefit Part A One child aged between 13 and 15 yrs	$86.87 x 1	$86.87
Family tax benefit Part B One child aged between 13 and 15 years	$25.70 x 1	$25.70
Remote area allowance	$7.80 x 2	$15.60
Total income	**$552.82**	

Establishing the cost of living

Travel, utility and rental costs

Nepabunna has no community store for the purchase of food and other household items. It is approximately 65 kilometres from the nearest major centre at Leigh Creek/Copley and 408 kilometres from Port Augusta. As a consequence families at Nepabunna need a car for weekly travel to Leigh Creek for shopping and for trips to Port Augusta to purchase clothes, larger household items or medical care. Many households have a car, or access to a car. No family at Nepabunna is in a financial position to purchase a vehicle outright; all must use a car loan repayment system.[1] Car loan repayments for 4–6 cylinder cars range from $100–$400 per month. This study sets a rate of $165.52 per month over a three-year period for a car purchased for $5,000.[2] This is deducted fortnightly from CDEP and pension incomes. Car registration of approximately $146 is paid three-monthly, as householders cannot afford the annual lump sum. Petrol costs are approximately $50 per week for two return trips to Leigh Creek and for periodic trips to Port Augusta for the purchase of clothes and health hardware.[3] A yearly sum of $1,040 has been added to cover cost of tyres and repairs.

Nepabunna residents have been paying full retail costs for their electricity for approximately five years. This is $80 per fortnight which is deducted from their CDEP or pensions by the community administrator and banked for them in order to meet individual quarterly accounts. Residents pay an additional $25 per week to the Housing Association to cover rent and house maintenance and repairs.[4] The community arranges for a local plumber to do periodic maintenance of all its houses. Residents do not pay for their water. We have included telephone costs, although not all families have access to a telephone. Table 4.7 approximates regular weekly expenditure for the hypothetical family for travel to purchase food, electricity costs and rental accommodation based on information gained from Nepabunna community members in a focus group in May 2006, and confirmed on 26 September 2006.

Schooling costs

Families on low incomes are eligible for a School Card which amounts to a payment of $175 per year per child for primary school children and $225 for high school students. School fees at Leigh Creek Area School for primary students are $175 per year. For Nepabunna residents school fees are cancelled out by the equivalent School Card payment.

1 Ideally, Nepabunna residents should have 4 wheel drive vehicles for all-weather access to Leigh Creek.

2 An ANZ $5000 loan at a fixed interest rate of 12.49% over 3 years will require payments of $82.76 per fortnight. Over two years the payments would be $115.44 per fortnight.

3 Petrol costs have been estimated with reference to the Red Book (2006).

4 Rental costs are means tested at Nepabunna so those on higher incomes would pay more than $25 per fortnight.

Medical and associated health costs

The hypothetical family is eligible for a Health Care Card.[5] Health Care Card holders pay $4.70 per prescription for medicines up to the threshold of $253.80 per annum. This represents 54 Pharmaceutical Benefits Scheme (PBS) prescriptions at which point medications are free, providing they are the least costly brand on the PBS schedule. However, Pika Wiya Aboriginal Community Controlled Health Service provides free pharmaceuticals at the community health clinic for those on a Health Care Card and pensioners. Health Care Card holders are also eligible for free emergency ambulance travel and some transport concessions. Nepabunna has an ambulance but public transport is not available. Aboriginal people at Nepabunna on wages can also use the Pika Wiya health service but they pay for their pharmaceuticals. Those on wages reported that they were not always able to pay for medications linked to diabetes and blood pressure despite the low cost (of medication).

Table 4.7: Travel, utility and rental costs for a hypothetical family at Nepabunna, 2006

Item	Cost per week $	Annual cost $
Car repayments	41.38	2,151.76
Car registration	11.23	584.00
Petrol	50.00	2,600.00
Additional car costs including tyres and repairs	20.00	1,040.00
Electricity per household	40.00	2,080.00
Phone (most have STD bar)	20.00	1,040.00
Rent	25.00	1,300.00
Water	0	0
Total	**207.61**	**10,795.76**

Nepabunna families seek dental care either at Leigh Creek or Port Augusta where they pay the full commercial rate, or with the public dental service operating through Pika Wiya where the service is free. The current waiting list for free dental care is around 14 months (Richards et al. 2002), so we have assumed that the majority of Nepabunna residents either go without regular dental care or use the private service at Leigh Creek. This was confirmed during the September 2006 trip when two pensioners reported going without dental and optical treatment. Testing eyesight is free through Medicare, but prescription glasses average around $260 per pair and ideally should be replaced every two years. The amount of $18.06 per week has been identified for medical costs. It includes one dental visit per year for both adults[6], one pair of glasses for one adult every four years, and travel costs. These costs are outlined below in Table 4.8.

Table 4.8: Weekly and yearly medical and associated costs for a hypothetical family at Nepabunna

Item	Cost per week $	Annual cost $
PBS prescriptions up to threshold for one family	Nil	Nil
Minimum dental care two adults per year*	4.03	210
Glasses – one pair per adult every four years	2.50	130
Travel plus accommodation	11.53	600
Total	**18.06**	**940.00**

* Dental care assumes one visit per year, plus dental hygienist visit.

5 To be eligible for a Health Care Card, Centrelink (2007) indicates that a family income for two adults and one child needs to be less than $734.00 per week.

6 Dental care for children is free in South Australia for Health Care Card holders and $30 per child for all other families.

Creation of a family menu and costing of items at local stores

Compiling a store box

Generating a stores box involved three processes:

(1) compiling a weekly family menu for the hypothetical family (Appendix 6) – this was done by three women at Nepabunna during the May 2006 visit to the settlement

(2) pricing the items at the Leigh Creek supermarket and Copley store, which, while more expensive than Leigh Creek supermarket, is able to send food to the Nepabunna settlement with the mail run, so was seen as a valued and much needed resource (Appendix 7)

(3) pricing these items in Adelaide for comparison (Appendix 8).

The weekly menu that formed the basis of the food list was based on what these three women at Nepabunna said they prepared for their families. Unlike the Tregenza and Tregenza (1998) study, no attempt was made to determine the nutritional value of the diet, although the women themselves did comment on the lack of fresh fruit and vegetables and the high cost of these items at Leigh Creek.[7] Both supermarkets at Leigh Creek and Copley provide a book-up system for Nepabunna residents where items purchased can be deducted from their pension or CDEP allowance.

The amount of food in the shopping lists is guided by the quantities from the *Australian Guide to Healthy Eating* (AGHE) serve sizes for each food group (Smith et al. 1998) and modified according to what people in the communities stated that they ate. For example, while the AGHE specifies that adults should eat three medium-sized serves of fruit per day and children should have two, the women in Nepabunna stated that each person ate about three pieces of fruit per week. Nepabunna residents also eat more meat and tinned baked beans and spaghetti than specified by the AGHE.

Survey of the cost of food from the weekly menu

A survey of supermarket items from the shopping list was conducted in May 2006 at both the Copley and Leigh Creek stores. The items listed in the menu, or available at Leigh Creek, were priced at the Pasadena Foodland Supermarket in Adelaide in May 2006 for comparison. Items were divided into groups that were bought weekly, fortnightly or monthly. The total cost of these items has been divided by two for fortnightly or four for monthly items and added to the weekly cost of shopping to gain an average weekly cost depending on how often they were purchased. When recording food items for pricing from the shops in Leigh Creek, Copley and Adelaide, a varied selection of brands, including generic brands, were included. This was done because Nepabunna residents informed us that generic brands were not always purchased, since they are not always the most economical. For example, more expensive brands of shampoo and detergent are necessary because of the hardness of the water at Nepabunna. Food costs were estimated to be approximately $143.61 per week. The list of food items from Leigh Creek can be found in Appendix 7. An additional $15 per week has been added for school lunches and trips to town, bringing the total amount to $158.61. The prices for food at Copley, Leigh Creek and Port Augusta were compared with prices for similar items in Adelaide in May 2006. Table 4.9 outlines the weekly costs of food items for Nepabunna and Adelaide residents and also gives a percentage mark-up on prices between the two localities.

7 Note however, that in Appendix 7 it is evident that there is little difference in price between Adelaide and Leigh Creek/Copley for fruit and vegetables. There are greater mark-ups on other shop items.

Table 4.9: Comparison of costs for weekly food items in Nepabunna and Adelaide

Food costs $		Health consumables costs $	
Nepabunna total weekly costs for food and non-alcoholic drinks, (excludes school lunches and snacks in town)	143.61	Nepabunna total weekly cost for health consumables	40.96
Adelaide total weekly cost for similar food excluding school lunches and snacks in town	124.09	Adelaide total weekly cost for health consumables	34.50
Difference in weekly costs for food	19.52	Difference in weekly costs	6.46
Percentage mark-up for food for Nepabunna residents	15.7%	Percentage mark-up for Nepabunna residents for health consumables	18.7%

Note: For a family of two adults and one child

Health hardware costs

A key argument of the Tregenza and Tregenza study (1998) is that the cost of living goes beyond food to include health consumables and health hardware. Tregenza and Tregenza (1998) define health consumables as household items needed to maintain personal and public health and hygiene such as bathing and showering, washing clothes, and the maintenance of a clean house. Household items coming under this heading include personal products such as soap and shampoo, cleaning agents such as disinfectants, and toilet cleaning products. The cost of health consumables came to $40.96 per week and is detailed in Appendix 7.

Health hardware consists of less frequent expenses such as brooms, mops, buckets, cooking utensils, blankets and other bedding, and white goods such as kettles, toasters, refrigerators and washing machines. These are often purchased at Port Augusta. Trips to Port Augusta are made on average 6–8 times a year and may be linked to visits to the doctor, relatives or for funerals. Families are responsible for the purchase of their own white goods such as refrigerators, irons, electric kettles, toasters, crockery and cutlery. The initial outlay is often provided by the Nepabunna Housing Association and the residents repay the loan by having it deducted from their CDEP or pension payments. We have calculated an on-going cost for this of $7.65 per week. The Department for Family and Youth Services (FAYS) also provides some second-hand white goods to pensioners; although the community felt that in some instances these products were of an inferior quality. Houses are equipped with a central heater and washing machine and minimal furniture. See Appendix 7 for health hardware costs. An estimation of the cost differences between health consumables in Nepabunna and Adelaide is provided in Table 4.9 and of overall costs of living for Nepabunna in Table 4.10.

Nepabunna residents purchase some clothes at Leigh Creek, but many larger purchases are made at Port Augusta, in order to take advantage of the increased range and cheaper prices. Most female community members said they bought clothes from second-hand shops and noted the difficulty of buying clothes for larger women. Some donations of clothing and other items are received from groups in Adelaide; however, these donations should not be seen as part of the hybrid economy as this is an unpredictable source.

Table 4.10: Estimated weekly and yearly costs for food, health consumables and health hardware

Item	Cost per week $	Annual cost $
Food (weekly shop and school lunches)	158.61	8,247.72
Health consumables	40.96	2,129.92
Clothing	20.00	1,040.00
Health hardware	7.65	397.80
Total	**227.22**	**11,815.44**

Note: At Nepabunna, May 2006

An estimation of the weekly expenditure of the hypothetical family

Table 4.11 provides a list of average weekly and annual expenses for the hypothetical family at Nepabunna in 2006. The hypothetical family income at Nepabunna is estimated to be $552.82 ($28,746.64 p.a.) with $452.89 per week ($23,551.20 p.a.) needed for basic essential items such as food, health consumables, health hardware, and general living expenses. This represents 81.9% of the family's income. These calculations do not include travel to funerals, holidays, Christmas and birthday gifts, family celebrations such as weddings or family-related emergencies. Nor does this calculation allow for occasional treats or (particularly important for populations with higher than average incidence of diabetes) adequate intake of fruit and vegetables. Other costs not included in the budget are purchase of Austar satellite pay television, sporting activities (including travel to sporting fixtures), cigarettes or alcohol, household furnishings, or personal care such as visits to the hairdresser.

Table 4.11: Average weekly and annual expenses for the hypothetical family

Item	Cost per week $	Annual cost $
Travel, utility and rental costs	207.61	10,795.76
Medical costs	18.06	940.00
Food, health consumables, health hardware & clothing	227.22	11,815.44
Total	**452.89**	**23,551.20**

Note: At Nepabunna, based on prices in 2006

Comparison of prices with the ABS Household Expenditure Survey

Table 4.12 shows the total weekly expenses of the hypothetical family and a comparison of some items with the average percentage of household income spent on these in the ABS Household Expenditure Survey 2003–2004. In this table an additional $15 has been added to the food bill for school lunches and snacks in town.

Statistics from the ABS Household Expenditure Survey (HES) 2003–2004 (ABS 2005) indicate that households ranked in the lowest 20% of income spend approximately $412 per week on goods and services. Households in the highest quintile spend around $1,484. These differences in the HES data are partly explained by household size, with households in the lowest quintile containing on average 1.5 people, as against 3.4 in the highest quintile (ABS 2005). This same report notes that households that rely on government pensions and allowances, on average, spend $455 per week on goods and services. The overall increase in the household expenditure on goods and services between 1998–1999 and 2003–2004 was $184. Of significance to the Nepabunna community is the 32% increase in domestic fuel and power and the 26% increase in petrol costs in the period. Electricity costs at Nepabunna are not subsidised; the community pays the full retail price.

It is interesting to note that the ABS average household expenditure for recreation was 12.8%, for tobacco 1.3% and for alcoholic beverages 2.6%. If these are included for the Nepabunna household, 98.6% of the total household income would be spent.

Table 4.12: Weekly expenses for the hypothetical family at Nepabunna

Item	Cost in $	% of Nepabunna family income	Average percentage ABS Household Expenditure Survey 2003–2004
Food and non-alcoholic drink	143.61	26.0	% not given
School lunches, snacks in town	15.00	2.7	% not given
All food	158.61	28.7	17.1
Health consumables	40.96	7.4	1.9% (personal care)
Fuel	50.00	9.1	% not given
Additional car costs	72.61	13.1	15.6% (total for transport)
Electricity	40.00	7.2	2.6
Phone	20.00	3.6	% not given
Rent	25.00	4.5	16.1
School	0.00	0	% not given
Childcare	0.00	0	% not given
Water	0.00	0	% not given
Health hardware items	7.65	1.4	5.8
Medical	18.06	3.3	5.1
Clothing	20.00	3.6	4.0
Total	**452.89**	**81.9**	**68.2**

Note: Also, percentage of income compared with the ABS Household Expenditure Survey 2003–2004 average

Limitations of the study findings and the impact of user pays for water services on the wellbeing of Nepabunna residents

This analysis uses a hypothetical family at Nepabunna. The weekly income is derived from CDEP figures and assumes only one adult is in receipt of this wage. While this may be an under-estimation of the income of families in mainstream employment, it is an over-estimation for those families at Nepabunna whose income is limited to either a disability or aged pension and who have responsibility for children. The analysis has also confined income estimations to the family unit, rather than households. While households may generate more than the $552.82 per week, our research indicates that it is erroneous to assume that household costs are shared equally in Aboriginal communities. Data from Nepabunna taken during the water meter reading exercise in 2005–2006 indicate variability in settlement population ranging from 46 to 64 people depending on the day of the week and time of the year. This is an additional variable in household costs.

The results of this study are similar to those of Tregenza and Tregenza (1998) for the APY Lands which calculated the cost of living at 84% of the income of a hypothetical family. The cost of living for Nepabunna residents is estimated to be around 82% of the income of a hypothetical family. The Tregenza study was done as part of the COAG trial of its *Healthy Store Policy* and the findings were used to argue against state government proposals to move to user pays for electricity.

The data illustrate that the majority of household income for the hypothetical family is spent on food and transport and other essential household health hardware and consumables. An increase in the cost of living would put a strain on families in similar situations. Increasing financial burdens runs counter to state policy concerned with Aboriginal wellbeing. The situation at Nepabunna would appear to apply to the sections in the National Water Initiative that acknowledge that some services that are uneconomical might need to be ‘maintained to meet social and public health obligations’.

Chapter five: Water use at Nepabunna

Introduction

This chapter commences with a brief overview of the nature and quality of the water supply system. The main focus of the chapter is an analysis of the water consumption data and the implications of the findings. The results of past investigations into alternative water resources in the region are outlined, followed by the results of the community discussion on water resources and water use efficiencies. In the latter part of the chapter concerns about the possibility of payment for water service delivery are raised.

Water supply

Rainwater collected from the roof of the basketball stadium is the only potable supply at Nepabunna. The rainwater feeds into a 195 kL ground storage tank before passing through an ultraviolet light disinfection plant. A dual reticulation system carries the potable supply to one tap at the kitchen sink in each dwelling and settlement building. The non-potable component of the settlement's dual reticulation system comprises groundwater from two bores, 0.5 km and 3.5 km from the settlement. The groundwater is pumped into two 195 kL ground storage tanks on a hill above the settlement from where it is gravity-fed to each building (Willis et al. 2004). According to Dodds and Sampson (2002) 'water production [from the bores] has been 20% lower [in 2002] suggesting that maintaining the water supply has been difficult'. One of the bores (N101) has a very slow recovery rate after pumping, and the bore has not been given sufficient rest from pumping to allow the groundwater levels to recover since monitoring began in October 1999, leading Dodds and Sampson to comment that 'current pumping regimes are beyond the sustainability of this well'. While the second bore (N149) is capable of sustaining a pumping rate that is double to treble that of bore N101, there is concern due to a lack of evidence that there has been any recharge replenishing the groundwater stores since December 1999, even following sizeable rainfall events (55 mm in 2 hours). More recently Morgan et al. (2003) have commented that the bores are being pumped at what is considered the sustainable extraction rates, but the maximum sustainable extraction rates are unknown (DWLBC as cited in Morgan et al. 2003). It is therefore recommended that the sustainable pumping rates of the bores be investigated further. Wastewater from a septic tank effluent disposal scheme is treated (filtered and chlorinated) to a quality that allows it to be used on planted landscape and revegetation areas within the settlement (DOSAA 2002).

Water quality

The groundwater at Nepabunna is highly mineralised, which is the reason a separate drinking water supply was established. The average Total Dissolved Solids (TDS) is 1,390 mg/L, hardness is 1,000 mg/L, iron exceeds 8 mg/L (Table 5.1), and sulphate is close to the health limit with a value of 450 mg/L. The highest recorded values and variability of TDS, sulphate, hardness, and iron found in the two bores in relation to the Australian Drinking Water Guidelines (ADWG) values are given in Table 5.1.

Testing for heavy metals in October 2000 shows elevated levels of arsenic (21 µg/L) and lead (30 µg/L) compared with the recommended ADWG values (7 and 10 µg/L respectively). Morgan et al. (2003) recommended that further testing for heavy metals be conducted. Fluoride and nitrate levels in both the potable and non-potable supplies are within ADWG (Morgan et al. 2003). In terms of microbiological parameters, samples taken from the settlement rainwater tank, non-potable water supply (at the fire hydrant and from each storage tank), and ultraviolet-treated water from a drinking water tap and a rainwater tap were tested in May and July 2003 for total coliforms and *E.coli* organisms. Organisms were found in the non-potable water supply. Morgan et al. (2003) recommend that since contaminated water comes into contact with people's skin during ablutions some form of disinfection of the water supply would be prudent to minimise the risk of infection. This recommendation is in keeping with the ADWG management framework which is a preventative risk management strategy proactive in identifying and rectifying risks in water supply systems. Under the ADWG water management framework, devices and procedures should be implemented in all water supply systems, and subjected to ongoing review to ensure that water quality is not compromised (NHMRC 2004). An example of this precautionary approach in managing the water supply in Nepabunna is the $470,000 spent in 2006 to replace two storage tanks (Figure 5.1) and install an ultraviolet light disinfection plant on the non-potable water supply (S Wurst 2006, pers. comm.[1]). It costs AARD around $2,670 per fortnight ($1,335 per week excluding maintenance expenses) to supply Nepabunna with treated water (abstraction, piping, storage, ultraviolet disinfection, reticulation) (L Morgan 2006, pers. comm.[2]).

Table 5.1: A summary of the bore water quality at Nepabunna

Component	ADWG value (mg/L)	Ave. concentration (mg/L)	Highest recorded value and variability of parameter
TDS	1,000	1,390	2,240; Bore 101 is variable
Sulphate	500	450	565 in Bore 101 over 3 dates, otherwise below 500
Total hardness	200(a)	1,000	1,275; Bore 101 variable, the means of the 2 bores are 1,080 and 840
Iron	0.3(a)	>8	8.81; Bore 101 is below 0.3

(a) Aesthetic guideline is shown (i.e. taste, odour, etc). Source: DOSAA 2002; Morgan et al. 2003.

Water use

Water meter readings (Appendix 9) were taken at all buildings over a 365-day period from 26 September 2005 to 26 September 2006 in a series of intensive six-week periods (with readings every Monday and Friday). To calculate per capita consumption, the number of people present in the house at the time of the meter reading was noted, that is, the number of visitors present, whether a resident was absent, and periods when the house was vacant. Water use was also estimated for the intervals between intensive measurements by comparing water meter readings at the end of an intensive measurement period with the meter reading at the start of the next intensive data collection period. The data are less accurate during the interval periods because corresponding population data are not available. The average daily per capita domestic water use over the year, during intensive measurement periods and interval periods is given in Table 5.2. Based on the data gathered during these periods, average per capita domestic bore water use is 435 L/p/d based on a population of 63 people (a population of 63 was obtained from the water use data collection and is used in all per capita water consumption calculations in Chapter five). The data exclude the potable (rainwater) use. The average per capita water use of 435 L/p/d (Table 5.2) is for 19 occupied houses.

1 Remote Communities Project Officer, Major Projects, SA Water

2 Aboriginal Affairs and Reconciliation Division, Department of Premier and Cabinet, South Australia

Figure 5.1: The water storage tank compound at Nepabunna, upgraded in 2006
Source of photograph: SA Water.

Table 5.2: Average daily per capita domestic water use at Nepabunna

Average water use (L/p/d)	Period over which the water use was calculated
435	365 days from 26 September 2005 to 26 September 2006
357	56 day period from 26 September to 21 November 2005 (intensive)
545	21 November 2005 to 27 February 2006
435	25 day period from 27 February to 24 March 2006 (intensive)
297*	73 days from 17 July to 26 September 2006 (intensive)

*Average for 18 houses; all other calculations are based on 19 houses.

In the sections that follow the data from the intensive collection periods are examined in relation to weekday versus weekend trends, the number of visitors or household occupants, temperatures, leaks, and the results of other studies.

Weekend and weekday water use and the influence of the number of occupants

An analysis of temporal patterns in water use in most houses at Nepabunna is complicated by varying occupancy. Some weekend records coincided with visitors, others showed absences, and some corresponded with the usual household occupancy. Low water use in some households is attributed to frequent absences of the occupants. Of the 19 occupied houses, only one household used more water on weekends than during the week (with the same number of people present), as shown in Table 5.3.

Table 5.3: Daily water use at one household: weekdays and weekends

Daily water use (L/p/d)	Period of data collection
1,113	Tuesday – Friday
1,176	Monday – Friday
1,207	Monday – Friday
1,650	Friday – Sunday
1,675	Saturday – Sunday
1,977	Friday – Monday
2,079	Friday – Sunday

Four households show frequent periods of no use, with two of these showing absences (i.e. no water use), mostly on weekends. The importance of knowing the occupancy rate of houses to determine accurate per capita water use is highlighted by the example of house 22.[3] During short periods when the house was undoubtedly occupied, water use is 168 L/p/d, but when the average water use is calculated over the 56-day period, water use is 75 L/p/d—due to the frequent absences.

There is little relationship between the number of occupants and the amount of water used. For example, the three houses with the highest water use have two permanent residents and only the occasional visitor, whereas in houses with five or more people present (residents plus visitors), water use ranges from 191 to 560 L/p/d (house 4), around 200 L/p/d (house 5), and from 171 to 2,161 L/p/d (house 8). A number of houses are occupied by a single person. The average water use over the year in the single occupancy houses was around 110 L/d. However, during the initial 56-day monitoring period one person used 200 L/d and another used over ten times that amount (possible reasons for this are discussed in the next section).

Water use in relation to seasonal temperatures

The variability of the population makes it difficult to decipher factors influencing water use. Nonetheless, a comparison of household water use over the year, during a hot period from 21 November 2005 to 27 February 2006 (when the average daily maximum temperature was 35.8°C) and during a cold period from 17 July to 28 August 2006 (when the average daily maximum temperature was 19.4°C), shows that of the houses that were undoubtedly occupied on those dates, most show more water use during hot periods (Figure 5.2). More detailed data analysis for one house is given in Table 5.4.

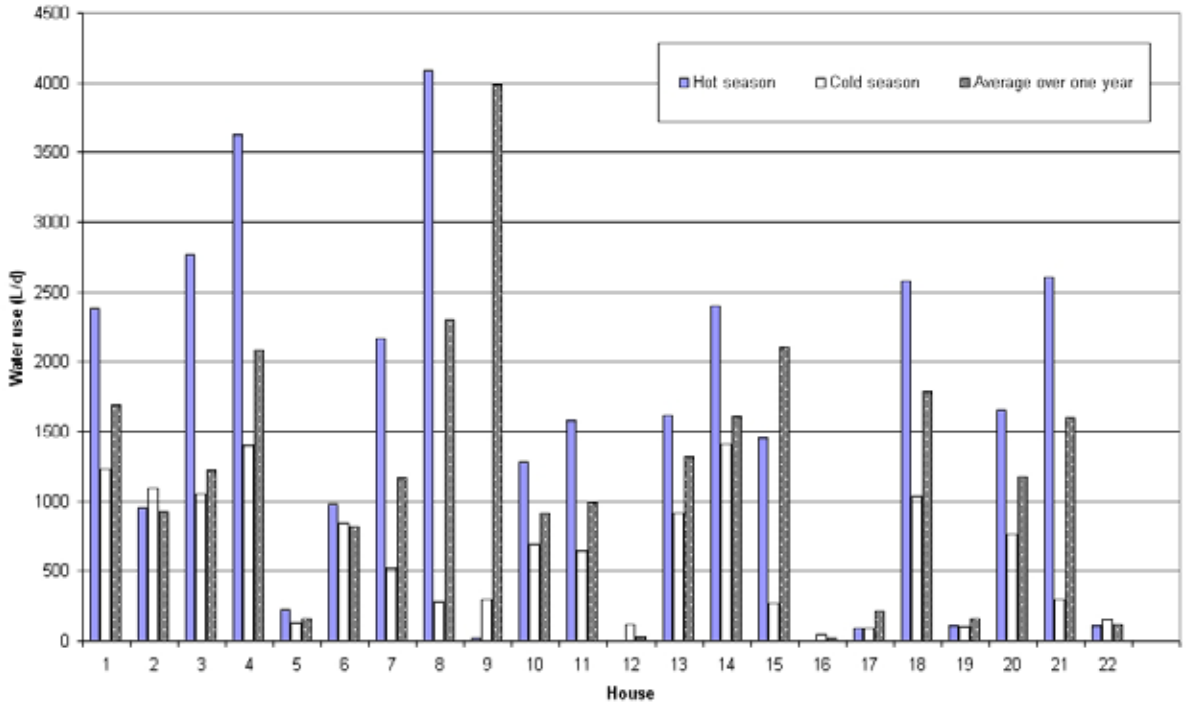

Figure 5.2: Average daily household water use over the one-year period and during a hot and cold season.

Note: A number of houses are frequently unoccupied (hence the average over one year is lower than specific short-term periods)

3 Households have been allocated coded numbers to enable the researchers to scrutinise data, while providing anonymity to the household residents.

Table 5.4: Increase in per capita water use at one house in relation to maximum daily air temperature

Water use	*Daily maximum temperature (°C)	Period
295 L/p/d	15.0°C – 20.8°C	17 – 31 July 2006
334 L/p/d	23.4°C – 33.3°C	26 – 28 September 2005
334 L/p/d	23.6°C – 28.7°C	10 – 16 October 2005
450 L/p/d	30.5°C – 36.2°C	14 – 20 November 2005
600 L/p/d	Nov mean 31.7°C; highest temp. 40.2°C Dec mean 35.3°C; highest temp. 45.4°C Jan mean 39.9°C; highest temp. 44.3°C Feb mean 35.1°C; highest temp. 43.7°C	21 November 2005 – 27 February 2006

*Source: Bureau of Meteorology 2005; Bureau of Meteorology 2006

Consumptive water use of evaporative coolers

All but two houses are fitted with evaporative cooling systems similar to that shown in Figure 5.3. The external component of the coolers can be installed to the side of the house (as shown in Figure 5.3) or on the roof. Where rainwater is collected from the roof for domestic use, evaporative coolers tend to be installed off the roof. According to the focus group participants the evaporative coolers are switched on during hot periods, and 'when people are cooking too—when people are cooking the blowflies come around. They put them [evaporative coolers] on to just blow 'em [the flies] out'.

Figure 5.3: An evaporative cooling system at a house in Nepabunna

A study conducted in Australia in 2001 (Australian Greenhouse Office 2001) found that 95% of homes in Australia use evaporative coolers for their domestic cooling requirements. Figure 5.4 illustrates how evaporative coolers function. The amount of water used by evaporative coolers depends on the dry bulb temperature, relative humidity, speed of operation (i.e. a low or high fan setting), the size of the cooler, and mineral content of the water supply which determines the

volume of bleed-off water (Karpiscak and Marion 1994). Where a water supply has a low mineral content, water can be recycled through the cooler, with the salt water flushed from the system through an automatic bleed-off when salt levels rise too high. Where the water is recycled the system will use around 7 L/hour. However, where the water supply has a high mineral content the cooler must be operated on a continuous water flow to prevent salt build-up on the pads and inside the cooler system. In Alice Springs evaporative cooler water use in a fully ducted house will be around 30 L/hour (Power and Water undated). At Nepabunna the evaporative coolers have to operate with the water running constantly because the high mineral content of the bore water means the salt build-up on the filters is extreme (as shown in Figure 5.5).

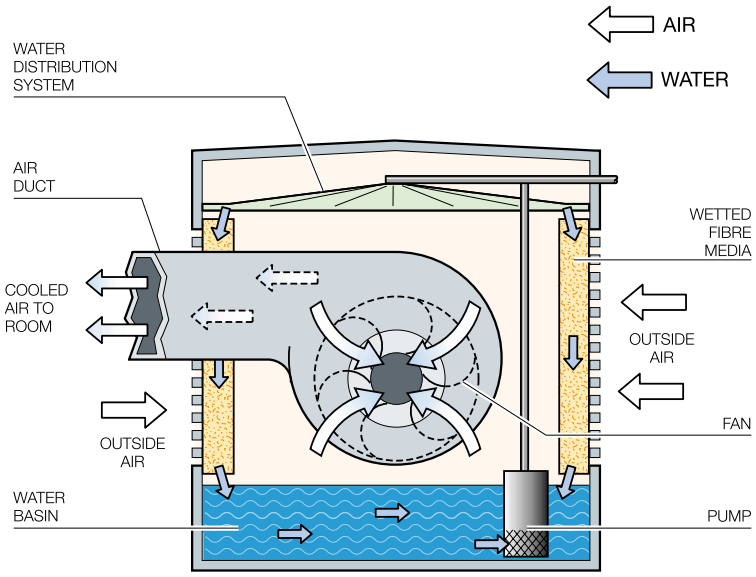

Figure 5.4: Schematic diagram showing how an evaporative cooler functions
Source: Victorian Government Department of Human Services 2001

Figure 5.5: The build-up of salts on and below evaporative cooling filters at a house in Nepabunna

In regions with long hot summers evaporative coolers can consume large amounts of water. According to Marshall Environmental Consultants (as cited in Institute of Sustainable Futures 2003), 85% of homes in Alice Springs use evaporative coolers, with over half stating that they run the cooler for 24 hours a day during summer. Summer conditions in Nepabunna are not dissimilar to those in Alice Springs, though in Nepabunna the water supply is more mineralised which results in higher water use. In this way conditions are similar to those of Phoenix, Arizona, USA where the high mineral content of the water supply means that evaporative coolers operate at the maximum water use of around 40 L/hour; temperatures in the hottest month range from 37°C to 43°C and cooling is needed for around 214 days in the year. Evaporative coolers in Phoenix can consume as much as 66.8% of the total summer water use (Karpiscak et al. 1998).

Based on a water consumption of 40 L/hour, the evaporative cooling system will use 400 L of water between 10:00 am and 8:00 pm. Continuous cooling for 24 hours will consume 960 L regardless of whether one person or five people live in the house. The operation of evaporative coolers may, therefore, partly account for the lack of relationship between the number of people in a house and the amount of water used. For example, between 21 November 2005 and 27 February 2006 – when the mean monthly temperature was above 30°C and the highest temperature each month exceeded 40°C (Table 5.4) – all but three of the occupied houses had an average daily water use exceeding 950 L. Presenting water use data on a per capita basis in such cases conveys a very different water efficiency message. Water use efficiency in this instance is a function of the cooling technology and not indicative of water use behaviour. Figure 5.2, which shows household water use patterns over different seasons, provides a clearer indication of the impact of temperatures (due to evaporative cooler use) on water consumption.

Sixteen of the 19 occupied houses during November 2005 to February 2006 used water at levels between 955 to 4,084 L/household/d (Figure 5.2). The remaining three occupied houses used between 108 and 220 L/household/day; the variance is explained by more frequent absences and/or the use of alternative refrigerative-based air conditioning units in the three houses. This raises the question of whether evaporative coolers are an appropriate form of temperature control in a water scarce desert region.

New evaporative cooling models may offer improvements in energy and water efficiency over the older, existing systems; and while alternative, refrigerative air-conditioners may use no water they add substantially to the household electricity costs and can be more expensive to maintain (Table 5.5). For example, if they are operated for 24 hours a day for a month, the electricity bill for air conditioning alone would amount to $744 (at an electricity rate of $1/hour). Clearly, refrigerative air-conditioners are not the solution to the problem. The power consumption of evaporative coolers is considerably lower, but even at a rate of $0.05/hour, if evaporative coolers run continuously all summer, the electricity costs for cooling alone would amount to $180 (Centre for Sustainable Arid Towns 2004). Evaporative coolers may be preferred in homes where people keep their doors open, or where children frequently open doors (Centre for Sustainable Arid Towns 2004). In some Aboriginal settlements in Northern Territory there has been a trend towards installing refrigerative air-conditioners, which are used on average 250 days a year for both cooling and heating. A number of problems have been reported with refrigerative air-conditioners: they account for over 50% of the annual electricity costs; they cool only one room (compared with evaporative coolers, which cool the entire house for the same electricity costs), which has led to entire families moving their mattresses into the lounge room to sleep in the only cool room in the house (Hoyal and de Vries 2006).

These findings point to the need for appropriate housing design that facilitates passive temperature control, avoiding the need to operate evaporative coolers for lengthy periods; and other housing features and installations such as robust, hard-metal door and window screens to keep flies from entering the house (instead of using the coolers to blow the flies out). Passive temperature control features include appropriate wall and ceiling spacing with insulation, light-coloured roof and walls, north eaves and blinds, shaded east and west walls in summer, no windows on western walls, optimal cross-ventilation, door seals, and appropriate house orientation (Centre for Sustainable Arid Towns 2004; Pholeros et al. 1993).

Table 5.5: A comparison of evaporative coolers and refrigerative air-conditioners

Item	Refrigerative air-conditioners	Evaporative coolers
Cost of energy for a 150 m^2 house	$0.80–$1.00 per hour	$0.05–$0.15 per hour
Water use at maximum setting	Nil	29,760 L per month
Cost of water at maximum setting	Nil	$29.76 per month based on $1.00 per 1,000 L
Maintenance	Technician is required for maintenance	Low technology, low maintenance, can be done by the homeowner
Purchase price	$4,000–$5,000 for a ducted system	A third to half the cost of refrigerative air-conditioners
Efficacy	Can drop the temperature more than 10°C. For each kWh of electricity used 2.5 kWh of heat is expelled	Temperature drop is higher in drier climates, but at a humidity of 30% and temperature of 35°C* can drop the indoor temperature by up to 10°C
Other	Can be used for heating	Fresh air is brought into the house from outside which may be of benefit to asthma and hay fever sufferers

Compiled from Australian Greenhouse Office 2001; Centre for Sustainable Arid Towns 2004; Karpiscak et al. 1998; Northern Territory Power and Water Corporation 2005; Sustainable Energy Development 2003.

* These are typical of average conditions in Nepabunna between November and February.

Leaks, unmetered water connections and data errors

Some of the unoccupied houses actually showed very low water use (e.g. one litre over a four-day period) indicating occasional use of a garden tap or a possible leak. The community proactively prevents leaks by financing three-monthly plumbing checks with maintenance in all the buildings.

The total amount of leakage in the settlement reticulation system is calculated by subtracting the sum of the water meter readings (41.8 kL/d) taken at each house and building in Nepabunna, from bore pumping rates over a similar period. This calculation, for the period May 2005 to May 2006, shows that around 2.4 kL/d or 5.6% of the groundwater pumped from the bore is unaccounted for. While the period of collection of groundwater pumping data does not precisely coincide with that of the individual meter readings, the data were collected over sufficiently long periods of time and matched for seasonality so as to provide a reasonably reliable indication of water use.

The unaccounted water may be attributed to minor errors, unmetered connections or minor leaks from the water pipeline infrastructure. For example, the water meter readings for the clinic over the 365 day period show some inconsistencies (it is possible that the meter is incorrectly installed) but if water use in the clinic during October/November 2005, and July–September 2006 is indicative, then water use at the clinic is very low: approximately 11 L/d at those times, or 45 L/d over the year. If there are leaks in the subterranean water infrastructure, given that only 5.6% is unaccounted for, a loss of that proportion – particularly given the harsh environment – is deemed acceptable. SA Water adjusts consumer meter readings in the Tod-Ceduna system by 10% to account for (and not charge consumers for) possible leaks. From 1997 to 1998 discrepancies between master and consumer meter data in the Eyre Peninsula region were as high as 29%; between 2000 and 2003 discrepancies ranged between 21% and 29% (Taylor 2003). In Alice Springs leaks account for 6% of total water use, whereas in some Aboriginal settlements in the Northern Territory where there is poor maintenance, leaks of up to 30% of total water use have been recorded (Hoyal and de Vries 2006).

Water use in non-residential community buildings

To obtain total water consumption figures at Nepabunna, the water used in all the community buildings (Table 5.6) is apportioned across the resident population and added to the sum of household meter readings. This adds a further 27.6 L/p/d of water use for the period September–November 2005; 31.6 L/p/d for February–March 2006, 83.7 L/p/d for July–September 2006, and 44.5 L/p/d over the year, resulting in a total community water use of 479 L/p/d over the year.

Table 5.6: Average daily water use in non-residential buildings at Nepabunna

Building	**Average daily water use (L/day) per building for the period:**			
	Sept–Nov 2005	Feb–March 2006	July–Sept 2006	Sept 2005–Sept 2006
Office	778	743	4,348	892
Work compound	660	1,224	655	1,656
Church	290	9	238	121
Clinic*	11	na	16	44
Women's group	3	7	na	11*
Shower block	0	0	0	0
Youth group	0	0	0	0
Cultural centre	na	6	15	13

* Refer to the text for an explanation of possible inconsistencies in the data

This method is problematic because it assumes only the usual 63 residents use the facilities, but in reality the office hosts variable but mostly large numbers of visitors. For example, there were on average 13 visitors each day over the July–September monitoring period. As Table 5.6 shows, the water use in the office block and work compound is fairly high. It is therefore recommended that water-saving technologies be installed in these buildings (as outlined in the 'Recommendations' in Chapter ten).

Current water use in Nepabunna in relation to similar studies

The average daily per capita water use calculated in this study is compared (Table 5.7) with the findings of Willis et al. (2004) and Keneally (2004). According to Keneally (2004) water use in Nepabunna is 1,090 L/p/d. It is likely that this figure is based on DWLBC bore pumping data, but this is speculation. It is also not known whether the figure includes an estimate of potable use. To the authors' knowledge individual household water meter readings have not been examined in any of the previous studies, or collected for any other purpose; this study therefore presents the most current and detailed account of per capita non-potable water use in Nepabunna.

Table 5.7: Average water use at Nepabunna in relation to results from other studies

Per capita water use (L/p/d)	**Place**	**Source of information**
435 in houses only; 479 in all buildings	Nepabunna	Current study, 365-day period from 26 September 2005 to 26 September 2006
1090	Nepabunna	Keneally (2004)
488–836 (for the population range of 70–120 people)	Nepabunna	Willis et al. (2004) based on DWLBC data for a four-month period between 1999 and 2000
455 in 2002 268 in 2004	Adelaide	SA Water (2002; 2004)
599 in 2002 220 in 2004	Country towns on SA Water Supply	SA Water (2002; 2004)
545 average all outback towns, SA	All outback towns	Keneally (2004)
282	Domestic average across Australia	ABS (2005)

The figures in Willis et al. (2004) and in Morgan et al. (2003) are based on the data provided by the DWLBC – the only known data at the time – and provide an indication of total water use by the settlement as a whole. For example, according to DWLBC 1,755 kL/month of groundwater was extracted during a four-month period from December 1999 to March 2000. If 2001 ABS Census data (53 people) are used to calculate per capita water use, the result is a consumption of 1,147 L/p/d, whereas if the lower range of the SAMLISA (2000) population data (70 people) are applied, then water use is 836 L/p/d. If the upper population figure of 120 given by SAMLISA (2000) is used, water consumption is 488 L/p/d. As this example shows, with such a mobile and variable population, statements about water use can be almost meaningless. Our study, however, looks at water use in conjunction with detailed population data. For example, in a particular household the average population over a three-day period may be 6.3 people. In another household the single occupant may be present from Monday to Friday only; in that case, water meter readings calculated over a five-day period will yield different water use results compared with if it were averaged over a seven-day period. This study therefore shows both the general settlement water use over the year (479 L/p/d) and the detail of how and why water use varies (Table 5.2; Table 5.3; Table 5.4; Figure 5.2), which provide insights into how and where water can be used more efficiently.

The rate of use of the potable supply is unknown. The rate of flow of the rainwater through the ultraviolet disinfection plant should be monitored for maintenance purposes (i.e. to know when to replace the lamps). It is therefore recommended that DWLBC monitor the rate of potable water use as it is the integral component of the settlement's water resources.

Past investigations into alternative water resources for Nepabunna

Potential water resource options include a surface storage dam, aquifer storage and recovery (ASR), reverse osmosis, additional drilling for groundwater and rainwater harvesting structures.

In 2000 a feasibility study (Clarke et al. 2000) considered whether excess surface flows in the creek during occasional rainfall events of high intensity but short duration might be directed to a temporary storage area and then pumped into an ASR system. Permanent surface storage is not feasible at Nepabunna because of the very high rate of evaporation (which exceeds rainfall tenfold) and the potential for salinisation. Martin and Dillon (2002) have looked into the potential for ASR in a number of desert regions of South Australia, but it appears as if ASR is not feasible at Nepabunna because the known aquifer in the region is small and likely to have a low storage capacity. Detailed recharge-recovery tests on the fractured rock aquifer would be required to evaluate the actual storage capacity. In terms of drilling for new aquifers, previous exploratory drilling has shown that aquifers in the region are hard to find: they tend to be highly localised and small. Therefore the cost of exploratory drilling in such unpromising conditions is going to be high. This means it is unlikely that the government would fund drilling to locate a new aquifer for an ASR scheme (Clarke et al. 2000). Furthermore, ASR requires an excess amount of water to be available for recharge. The problem at Nepabunna is that good rains are rare events, which increases the risk that many years might pass before the aquifer would be recharged through ASR (Martin and Dillon 2002). For these reasons ASR has not been considered further (S Wurst 2004, pers. comm.[4]).

4 In 2004 S Wurst was an employee of the Department for Aboriginal Affairs and Reconciliation. He is now employed by SA Water.

The technology to improve bore water at Nepabunna is available through reverse osmosis (RO). RO is a technology currently used with success, although at considerable expense ($4.50/m^3) to the provider, at Yalata and Umoona. According to Morgan et al. (2003) RO would be the most appropriate and cost effective way of rendering the groundwater at Nepabunna potable. The groundwater would have to be chlorinated first and then filtered to remove iron, and have anti-scalant added to lower the salinity and hardness of the supply before undergoing RO. Based on 2003 pricing, such a scheme would cost around $500,000 for a 90% recovery rate; this excludes the costs of electrical connections, pumping, effluent disposal infrastructure, storage tanks for the treated water, project management, delivery, and commissioning fees (Morgan et al. 2003). Depending on the salinity of the water supply, the RO process can result in a sizeable proportion of the water supply being discarded as brine effluent. If RO were implemented at Nepabunna groundwater extraction would have to increase by a further 15% just to accommodate the waste effluent (Morgan et al. 2003).

When a water supply for Nepabunna was initially being sought, a number of exploration bores were drilled in the region but, other than the current two bores used in Nepabunna, they did not find a sustainable groundwater resource close by (Clarke et al. 2000). Exploration bores further west of the settlement could be revisited to test their feasibility as a supplementary groundwater supply.

Results of the contingent valuation study

During one of the early discussion sessions with adult members of Nepabunna community, the past investigations into alternative water resource options were discussed. What was apparent was that the community was largely unaware of the studies that had been conducted in the past and why certain options were not feasible. For example, with reference to the existing supply one participant asked:

> *How do you know it's only going to last 10 years? If they knew that the bore was only going to last 10 years then why didn't they dig out another bore that'd last for 40 or 50 years or something like that? Instead of digging a hole that will last only 10 years.*

The session served as a forum for the exchange of information and discussion around the sorts of alternative water resource options the community would like to see implemented in Nepabunna. A range of concerns were raised by the community, but there was an air of despondency among participants about issues that were being raised: 'We've been through this argument 20 years ago … nothing will come of it'. They spoke of the 'rotten' water quality of the non-potable supply. Participants related how the possibility of a storage dam was raised '10, 15, 20 years ago!' and they asked, 'Where's the dam they promised?' These initial discussions enabled the research team to compile a list of feasible options that the community would be open to discussing in more detail at a later stage in the project.

In a subsequent focus group the subject of alternative water resource options and areas for water savings was raised in a semi-structured manner – three categories of options were opened for discussion: alternative water resources (nature's options), options to lower the use of groundwater (i.e. to improve sustainability of the supply), and water saving options at a household or personal level. Following the discussion about the types of technologies that could extend the availability of water resources to the community, the discussion was guided towards their willingness to pay for such improvements. The discussion formed part of the adapted contingent valuation methodology (as outlined in Chapter three).

Participants were given one brief illustrated fact sheet at a time (Appendix 4) to help generate an informed discussion on the topic. A brief summary outlining the general cost of the water service delivery or improvements was also given. The participants were then asked to comment on the options provided (an excerpt from one fact sheet is shown in Box 5.1).

If a rainwater catchment system were built (similar to the one shown in Figure 5.6) would each household be willing to contribute:

- $5 per fortnight towards the maintenance costs (i.e. around 4% of AARD's basic costs)
- some financial contribution towards the basic and maintenance costs, but less than $5, perhaps $……per fortnight
- some financial contribution towards the basic and maintenance costs, more than $5, perhaps $……per fortnight
- nothing towards the maintenance, because……..

Box 5.1: An excerpt from the contingent valuation fact sheet provided to the focus group members for discussion

Modifications to the existing water supply system

One of the scenarios put to the focus group in the contingent valuation study was to extend the rainwater harvesting system to address both the quality and quantity issues of the non-potable water supply. A schematic diagram of the proposed extension to the rainwater harvesting system is shown in Figure 5.6.

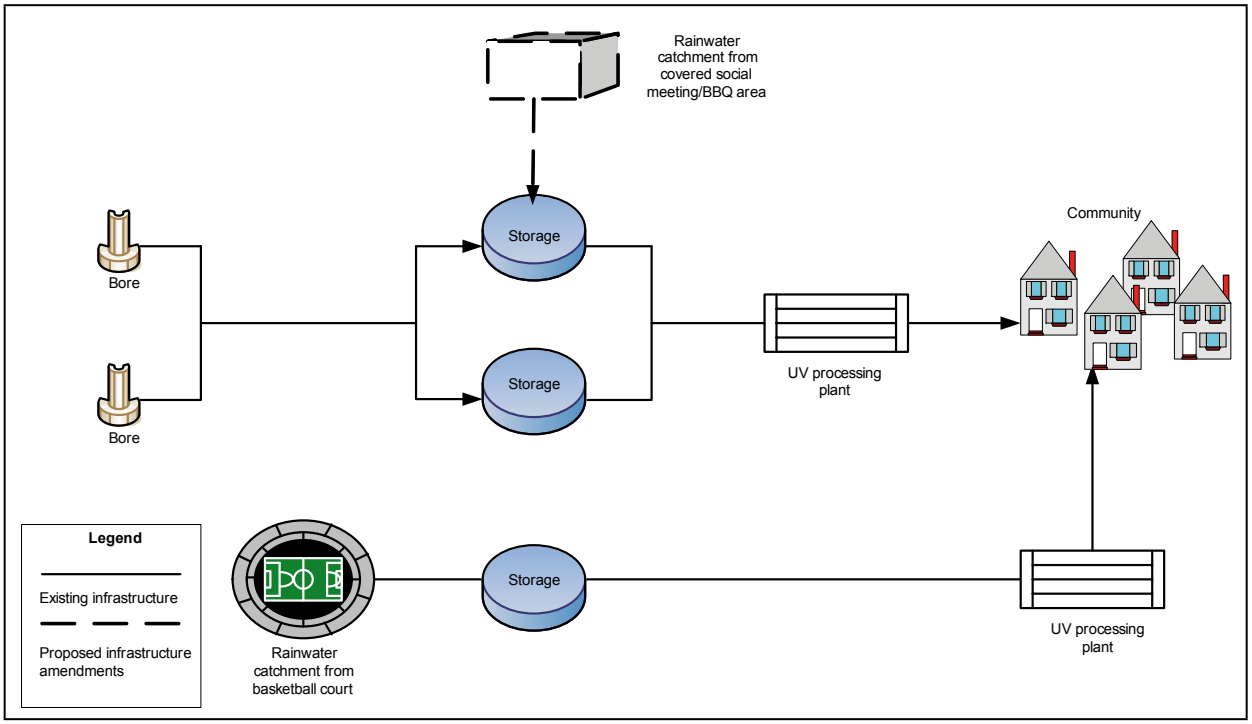

Figure 5.6: Schematic diagram of Nepabunna's dual reticulation system, with proposed rainwater harvesting extension

Source: After Morgan et al. 2004

Rainwater alone is not able to meet the water needs of the settlement, although it is thought to satisfy the potable water requirement. The proposal was for a new large roof area to serve as a rainwater catchment and feed into the groundwater storage tanks. This would obviate the need for additional storage which is an expensive component in a water supply. Rainwater would supplement the groundwater bore supply, reducing the reliance on the groundwater resource and the amount to be extracted on a daily basis, extending the life of the bores. Nepabunna is not short of space, and with a large enough catchment surface and existing capacity in its storage facilities, a rainwater collection structure could provide additional and sustainable water despite the low rainfall, at reasonable cost to the settlement/government. The shandied mix of groundwater and rainwater would lower the salinity and hardness of the water, with a concomitant reduction in maintenance costs to pipes, pumps and plumbing fittings caused by the highly mineralised water. The additional rainwater could also be isolated from the groundwater supply by feeding directly into one of the storage tanks to augment the potable supply if necessary, or to serve as a backup potable supply in the event of a breakdown in the second system, particularly now that a disinfection plant is installed on both supply systems.

The main concern with the supplementary rainwater harvesting option was 'But is it going to rain? We've only had about 2 inches of rain this year [2006] and it's gone half way through the year'. Participants were sceptical that money would be spent on such infrastructure (rainwater harvesting is initially expensive to establish), but added that they would be supportive of the idea 'if it rains!'

Participants favoured a second scenario of drilling new bores to supplement the water supply, although there was concern about dry wells: 'What if they dig another bore and find no water?' Greater concern was expressed about developments such as tourism: 'the tourists coming there [to neighbouring Iga Warta] and wasting all that water'. There was concern that 'If we're going to share the water with Iga Warta that wouldn't last 10 years then'. Some participants added concerns about the perceived waste of water by mining companies, the tensions due to perceived wastage by tourists at Iga Warta, and suggested that ideally two bores should be drilled – one for Nepabunna and one for Iga Warta. Alternatively, if only one bore became available there would have to be a metered sharing arrangement. Generally, the consensus was that it is AARD's duty to provide additional bores when the existing bores dry up.

When the willingness to contribute to a new bore was raised, the immediate response was that $5 per household would not be enough to cover the cost of installing the bores, indicating that members of the community are aware of the expense of such infrastructure. The atmosphere in the focus group quickly became sombre, with a number of concerns being raised: 'Why would we pay for water? It's our country, it's our land, we're on it'. There was concern that AARD would not pay for any new developments and that the community will 'end up paying out of our own pockets' for any improvements. Concern centred on affordability: 'People haven't got jobs, people are pensioners'.

Community members feel that part of the reason that some people live out in remote settlements is to get away from the economic hardships associated with the cost of living in towns:

> *In town people walk away from their own homes. They can't even pay rent or stuff like that ... People just walk away. That's going to happen in the outback. That's what's gonna happen out this way. We know people, leaving houses in town, just walking off and living with someone else because they can't pay for water and power.*

The despondent resignation on the topic is summarised in the comment, '[We] might as well go back and live in a wurlie … somewhere.'

Water-saving options within the home

In a third scenario, participants were shown images of a range of water-saving devices such as dual flush toilets, water-efficient showerheads and kitchen aerators (Figure 5.7) commonly used in homes throughout Australia as a means of reducing water use, and household water costs.

Figure 5.7: Images of a dual flush toilet, water-efficient showerhead and kitchen aerator
Note: Images were shown to focus group participants

The nominal cost of the devices and the potential water savings of each device was summarised in a brief fact sheet (Appendix 4, fact sheet three) and distributed to all focus group participants to facilitate discussion. For example, the fact sheets mentioned that a dual flush toilet fitting can cost around $30 or less, and save 6.5 L per full flush (i.e. the full flush on a water-efficient toilet uses around 4.5 L per flush compared with 11 L in some toilets). This water saving option generated little discussion other than the comment by a number of participants that, 'we're going backwards' and a generally negative response to the idea. There must have been some misunderstanding because a subsequent tour of a few houses in Nepabunna showed the presence of dual flush toilets.

Water use statements as a water saving 'tool'

With reference to urban areas only, the NWI (Clause 66(iv)) requires the 'development of national guidelines for customers' water accounts' so that householders are given information about their water use compared with equivalent households in the area (Environment Protection and Heritage Council 2006). In response to this requirement, a draft of the proposed national metropolitan initiative for customers' water accounts was released for public comment (on 5 September 2006). In the proposed accounts system, in Brisbane for example, the customer is shown their current water use, their use in comparison to the same period the previous year, the local suburb average and the metropolitan average for the same period (see Figure 5.8). Other examples show simple graphs of 'typical' and 'efficient' water use for the number of people and the size of the house (Environment Protection and Heritage Council 2006).

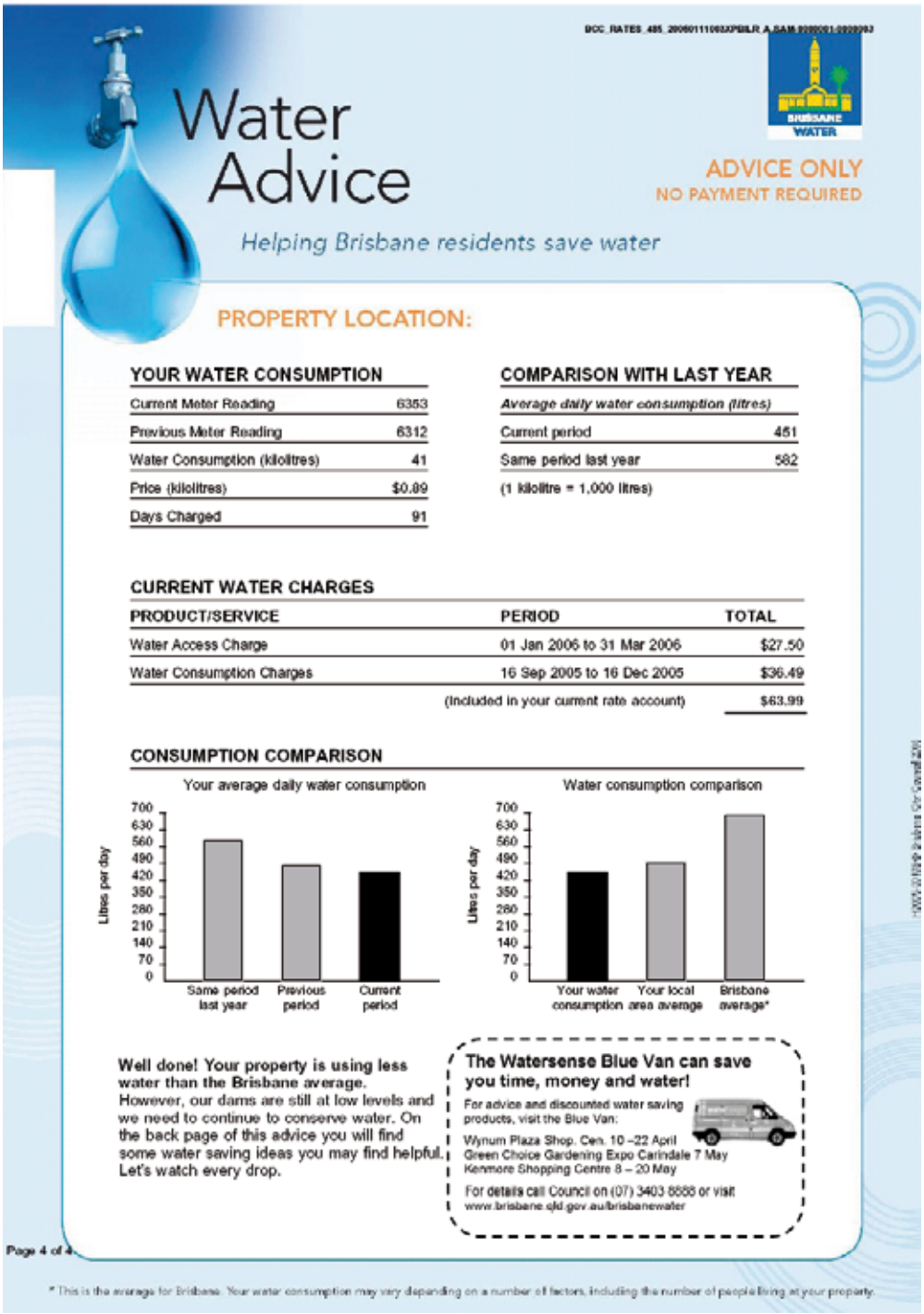

Figure 5.8: A proposed Brisbane water account

Note: Account shows comparative water use as outlined in the proposed 'National guidelines for metropolitan customers' water accounts'

Source: Environment Protection and Heritage Council 2006

While the proposed water account system applies to urban areas only, the application of such a system in Nepabunna was raised with the focus group, not as an invoice, but as a tool that informs residents of their water use. The statement would be an educational tool to illustrate what an average or water-efficient house would use, it would serve as a reminder of the need to save water, and it would simultaneously provide tips on how reductions in water use could be achieved (Figure 5.9); the tips or ideas could be varied in successive statements. Participants favoured the water statement idea, saying 'I suppose it will make people think for themselves maybe they're using too

much [water]…' The community is acutely aware of a lack of rain and the declining water supplies in the region, commenting: 'People are talking about Leigh Creek—the dam is running out of water. They're going to use groundwater too, they [were] just talking about it the other day'.

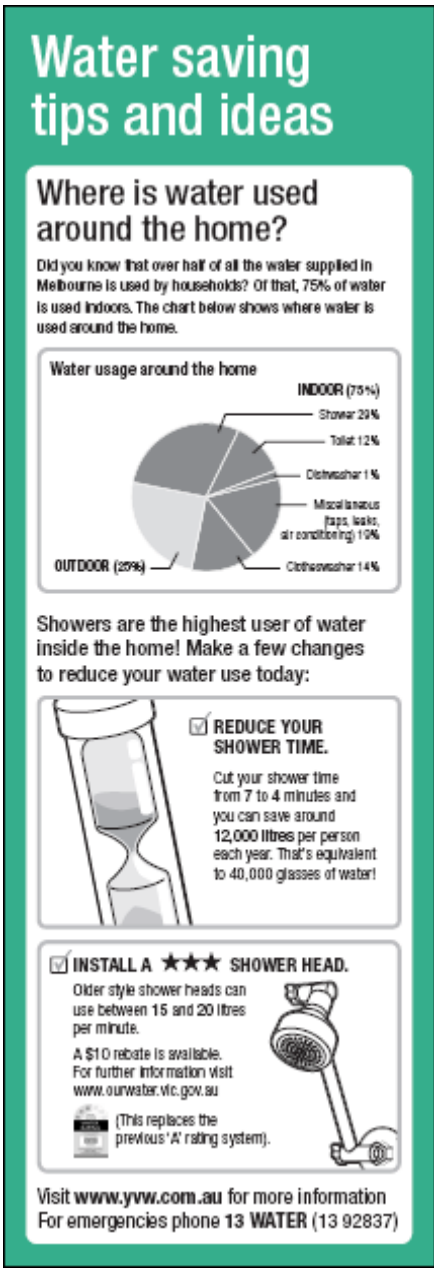

Figure 5.9: The second page of the proposed Yarra Valley Water account

Note: The page shows tips and ideas to reduce water use as outlined in the proposed 'National guidelines for metropolitan customers' water accounts'

Source: Environment Protection and Heritage Council 2006

In tandem with the idea of a comparative water use statement as a means of informing residents of their water use, the idea of charging only where water use was excessive was raised with the community. That is, all households could, for example, be allocated a free basic allowance of 200 L/p/d. While water use in most of the houses at Nepabunna is modest and below that of the average for South Australia's outback towns (c.f. Keneally 2004) there are a few houses in which occupants use over 600 L/p/d; as well as isolated incidents, such as where the occupants went away and left a tap running in the house (it was only detected as a result of the water meter readings and population data being collected as part of this study). In the incident where the tap was left running the average water use during that period was 472 L/d, but if the errant household is omitted from the calculations and then they are adjusted for the population difference, the average water use for the settlement is 297 L/p/d. This calculation highlights how one or two 'outliers' can skew the data.

While a few members of the community agreed with the principle of the suggested water statement – to prevent the wastage of water – it would be difficult to implement for a number of reasons. Firstly, the number of residents and visitors living in Nepabunna households varies from day to day. Secondly, it would require employing someone to regularly read the meters (and note the corresponding population). Thirdly, it could be difficult to implement as one might be seen to be accusing individuals of excessive water use which could lead to antagonistic relationships.

The community were not averse to the concept of user pays for water use above a set allocation. However, Nepabunna Community Council has a strong sense of equity in its many welfare programs. As outlined in Chapter four, the Council and Housing Association assists individuals to maintain health and wellbeing through a program of loans and means tested charges for rent and other services.

For example, house rent is means tested at Nepabunna and families can borrow money to purchase large household items such as a fridge or washing machine, paying these off over a number of weeks. In discussion the community were clear that any move to charge individuals for excess water use would also need to be means tested. This would certainly be the case for families whose income came close to that of the hypothetical family.

Conclusion

The average daily domestic per capita water use at Nepabunna (435 L/p/d) is more than that of people living in Adelaide (268 L/p/d), but less than the average in South Australia's outback towns (545 L/p/d). The figures can, however, be misleading because the average water use in the majority of the 19 homes is modest (even if it is partly related to frequent absences in some cases), but there are a few houses where water use is high. Notwithstanding this result, the question of whether people should be 'penalised' for excesses related to inappropriate housing design (and cooling systems) is just one of the 'technology' issues that need to be addressed before charging for excess water use can occur. Other issues, including financial concerns, are discussed in Chapters four and ten.

Chapter six: Cost of living at Yarilena and Scotdesco

Introduction

The settlements of Yarilena and Scotdesco were included in the study as examples of settlements outside the Commonwealth-State Bilateral Agreement on Essential Services. Yarilena settlement is discussed first, followed by Scotdesco. As with the discussion on Nepabunna, the data from the water audit is in the following chapter.

Construction of a hypothetical family

As for Nepabunna, the data sources used for the construction of hypothetical families in Yarilena and Scotdesco were the 2001 Australian Census published by the ABS (2002), data from the National Aboriginal Health Strategy R3 Project Impact Assessment (Parsons Brinckerhoff 2005), and data gathered during this study as part of the water audit and focus group discussions. The period of data collection was December 2005 to December 2006.

Yarilena population

In terms of the ABS Australian Indigenous Geographical Classification, Yarilena is one of four Indigenous Locations (ILOCs) which make up the Indigenous Area (IARE) known as Ceduna, namely Koonibba, Tia Tuckia, Yarilena and the remainder of Ceduna District Council area. At the time of the 2001 ABS Census, the population of Yarilena was 57, with 95% (54) identifying as Aboriginal and the remaining 5% (3) being non-Aboriginal (Table 6.1). In 2001 the settlement comprised slightly more females than males (30 females, 27 males). Data from the National Aboriginal Health Strategy (NAHS) R3 Project Impact Assessment 2000 supports the ABS population figure and indicates that Yarilena had a population of 57.

Table 6.1: Population of Yarilena 2002

Aboriginal			Non-Aboriginal			Total		
Males	Females	Total	Males	Females	Total	Males	Females	Total
27	27	54	0	3	3	27	30	57

Source: ABS 2002

The most recent source of population data comes from the community itself. In July 2006 a research assistant in the community indicated that there were 27 males and 30 females in the settlement giving a total population of 57, showing that there has been minimal change in the population over the last five years. In this survey the research assistant was only asked to differentiate between Aboriginal and non-Aboriginal members of the community if the person differentiated themselves.

Age composition

Table 6.2 presents the age composition of the Aboriginal population of Yarilena at the time of the 2001 Census. The population is relatively young, with the majority of the population (68%) being children and young people under the age of 25. The median age for Aboriginal people at Yarilena is 14. Only 3 residents fell in the 50–54 year bracket. Males outnumber females across all age

groups except for the 15–24 year bracket where there are twice as many females as males. Table 6.3 presents the age composition of the Aboriginal population of Yarilena in July 2006. Again, the population is relatively young, with just over 60% being children and young people under the age of 25 but there is a growing older population, with 5 women between 45 and 64 as opposed to none in the 2002 figures. In 2002 the only age group in which males significantly outweighed females was in the 5–14 year age grouping. This has now changed with females outnumbering males in the following age groups: 0–4, 25–44 and 45–64. In 2006 females make up 53% of the population, while in 2002 females made up only 38%.

Table 6.2: Age composition of the Aboriginal population at Yarilena, 2002

	Male	Female	Total
0–4 years	6	3	9
5–14 years	12	4	16
15–24 years	3	6	9
25–44 years	7	6	13
45–64 years	3	0	3
65+ years	0	0	0
Total	**31**	**19**	**50**

Source: ABS 2002

Note: 2001 ABS Census data for Yarilena presents ages for 50 Aboriginal persons only and not the total population of 54 as shown in Table 6.1.

Table 6.3: Age composition of the Aboriginal population at Yarilena, July 2006

	Male	Female	Total
0–4 years	2	7	9
5–14 years	11	7	18
15–24 years	5	2	7
25–44 years	6	9	15
45–64 years	3	5	8
Total	**27**	**30**	**57**

Source: Community collected data, July 2006

Household size

The ABS Census 2001 indicates that the mean household size for the Aboriginal population of Yarilena was 4.2. The non-Aboriginal mean household size was 4.0. At the same time, it is interesting to note that the corresponding figures for the South Australia north-east Indigenous Area were 3.8 and 2.5 respectively. Therefore the size of households at Yarilena was higher than the figure at the regional level for both Aboriginal and non-Aboriginal households. Although the NAHS data (Parsons Brinckerhoff 2005) did not provide information about the number of people living in each household at Yarilena, the data did indicate that there were 18 habitable houses for a population of 56. This results in a population density measure (PDM) of just over 3 (56/18).

As part of this study, a member of the community collected data relating to household size. This is shown in Table 6.4. Households ranged from one to seven people per household, with only 15 houses occupied. On the basis of the population profile and household size, the hypothetical family was set as two adults and two children, both under 15 years of age.

Table 6.4: Household size at Yarilena, July 2006

House number	Number of adults	Number of children under 15	Number of children in 15–19 age group
1	2	1	0
2	2	2	0
3	2	5	1
4	1	0	0
5	0	0	0
6	2	2	0
7	3	0	0
8	2	2	0
9	2	3	0
10	1	4	0
11	3	0	0
12	2	2	0
13	2	0	0
14	2	3	0
15	2	4	0
Total	**28**	**28**	**1**

Source: Community collected data, July 2006

Note: Households have been allocated coded numbers to enable the researchers to scrutinise data, while providing anonymity to household residents.

Calculation of the income of the hypothetical family

Employment opportunities at Yarilena

People living at Yarilena are engaged in CDEP activities along with mainstream employment. This is shown in Table 6.5 where it can be seen that 50% (10) of the Aboriginal labour force were participants in CDEP at the time of the 2001 Census, while 50% (10) were employed in other areas. There were no non-Aboriginal residents in Yarilena in 2002 or in 2006. Using figures from Table 6.5 the labour force status for the population aged 15 years and over can be calculated, and this is presented in Table 6.6. In this instance, the total population aged over 15 consists of the sum of the total number in the labour force and the total number not in the labour force.

Table 6.5: Employment of Aboriginal people in Yarilena 2002

	Males	Females	Total
Employed CDEP	6	4	10
Employed other	3	7	10
Total labour force	9	11	20
Not in the labour force	3	0	3
Unemployment rate	0	0	0

Source: ABS 2002

Table 6.6: Labour force status for residents of Yarilena

	Employment/ population ratio		Proportion not in the labour force	Total 15+	
	CDEP %	Other %	%	%	Number
Aboriginal	43.5	43.5	13.0	100	23
Non-Aboriginal	0.00	0.00	0.0	0	0

Source: C McCarthy 2005

Data collected by the community in regard to employment reveals that there has been little change in the employment situation for the Aboriginal population since the 2001 ABS Census. Table 6.7 shows that there has been an overall increase of only one person in the labour force and a slight variation in the composition of the labour force, whereby the number of females has decreased by one person, while the number of men has increased by two. In addition, the community data indicate that seven community members are unemployed and in receipt of unemployment benefits in 2006.

Income derived from CDEP and other employment at Yarilena

Key sources of income in Yarilena include CDEP participant wages, salaries from mainstream forms of work, and Centrelink benefit payments. Table 6.8 shows the median weekly income at the level of the individual and family for Yarilena and all other Indigenous Locations in the ABS Indigenous Area of Ceduna (DC). The table also includes house rental charges, one of the primary ongoing expenses to be deducted from income. Based on the ABS 2001 Census, the data shown relate specifically to gross income derived from sources such as wages, salary, pensions, unemployment benefits, family allowances, student allowances and maintenance. Family income is made up of the sum of individual incomes of each resident family member aged 15 years and over who is present in the household on census night. Family income is not applicable to non-family households, such as group households or lone person households; or to people in non-private dwellings.

Table 6.7: Employment in Yarilena 2006

	Males	Females	Total
Employed CDEP	8	2	10
Employed other	3	8	11
Total labour force	11	10	21
Not in the labour force	1	0	1
Unemployed	1	6	7

Source: Community collected data, July 2006

Table 6.8: Median weekly income for Indigenous Locations in Ceduna (DC) IARE

Indigenous Location	Median weekly individual income $		Median weekly family income $		Median weekly rent $	
	Aboriginal	Non-Aboriginal	Aboriginal	Non-Aboriginal	Aboriginal	Non-Aboriginal
Yarilena	200–299	n.a.	500–599	n.a.	1–49	n.a.
Koonibba	160–199	n.a.	300–399	n.a.	1–49	n.a.
Tia Tuckia	160–199	n.a.	600–699	n.a.	1–49	n.a.
Ceduna (DC) remainder	160–199	300–399	700–799	700–799	50–99	50–99

Source: ABS 2002

At the individual income level, Table 6.8 shows that for Aboriginal people Yarilena had a higher income than other settlements in the same ABS Indigenous Area with incomes in the $200–$299 range while the other settlements fell in the $160–199 range. At the family level, the median weekly income for Aboriginal people in Yarilena was $500–599. Among the other Indigenous Locations in the same Indigenous Area, Ceduna DC remainder, had the highest weekly family income ($700–799), followed by Tia Tuckia ($600–699) while Koonibba fell in the lowest range at $300–399. In this study, our focus has been on calculating the weekly family income for a hypothetical family. The 2001 ABS Census figures therefore provide an indication of the level of family income which might be considered reasonable at the time of the study.

House rental charges for 2002 are shown in Table 6.8. Rent paid by Yarilena residents appears to be similar to other Indigenous Locations ($1–49) except Ceduna ($50–99) which is the major town in the area.

The customary economy at Yarilena

There is some evidence arising from discussions in focus groups that recreational fishing is a regular activity in the community and may supplement the weekly diet. However, we have not calculated this in the weekly income for the hypothetical family because of the difficulty of making an accurate estimate of the impact of this activity on income.

The hypothetical family income

Given the population, household size, age profile of children, and the employment characteristics of the adults, the composition of the hypothetical family at Yarilena is identified as two adults, both deriving income from CDEP, and two children, one child aged 13 to 15 years and one child under 13 years.[1]

The hypothetical family receives an income based on current CDEP payments (*CDEP Guidelines 2005–06*) of $206.00 per week (non-remote rates along with a $10.40 CDEP supplement, Family Tax Benefit Part A and B). On the basis of these payments, the average weekly income for the hypothetical family at Yarilena is estimated to be $609.75 or $31,707 per annum. Details of these calculations are shown in Table 6.9. These calculations use Centrelink payment rates applicable during the period 20 March to 30 June 2006. Residents at Yarilena are not eligible for the CDEP remote rate because of their proximity to Ceduna.

Table 6.9: Calculation of the income of the hypothetical family in Yarilena

CDEP	$206.00 x 2	$412.00
CDEP supplement	$10.40 x 2	$20.80
Family Tax Benefit Part A		
For 1 child under 13 years	$68.53	
For 1 child 13–15 years	$86.87	$155.40
Family Tax Benefit Part B	$21.55	$21.55
Total weekly income	**$609.75**	

Establishing the cost of living

Travel, utility and rental costs

Yarilena is approximately 7 kilometres from the town of Ceduna. According to focus group participants most families at Yarilena have a car for travel to Ceduna for shopping and to drop children off at school. Daily return travel to Ceduna for shopping, work or dropping children at school is approximately 30 kilometres. Ceduna has two supermarkets, and a number of other shops. There are two shops that sell clothes. Residents of Yarilena stated that they try to buy the bulk of their clothes at Port Lincoln or Port Augusta and might travel there once every 3 months for this purpose. Residents also need to travel to Port Augusta periodically for dental treatment and other medical needs. Ceduna is 400 kilometres from Port Lincoln and 465 kilometres from Port Augusta.[2]

1 It is also reasonable to assume the hypothetical family at Yarilena comprised two adults and two children with both adults on wages, or one adult on a wage, and one on a CDEP. Given that the hypothetical family exercise is meant to provide an estimate of cost of living, only one hypothetical model has been developed.

2 Petrol costs have been estimated with reference to the *Red Book*, 2006.

A car loan repayment system is generally used to purchase vehicles in Yarilena. For a car loan of $5,000 the repayment rate is $82.76 per fortnight over a three-year period, deducted fortnightly from incomes.[3] Car registration of approximately $146 is paid three-monthly. According to focus group participants petrol costs are between $40 and $80 per week depending on car size and distance travelled. We have used an average of $60 for the hypothetical family for weekly petrol. This estimate covers weekly travel to and from Ceduna, travel to sporting events and periodic trips to Port Augusta or Port Lincoln for purchases, but does not include travel for dental appointments. An annual sum of $1,040 has been added to cover cost of tyres and repairs. The Mobile Aboriginal Patrol picks pensioners up from Aboriginal settlements close to Ceduna including Yarilena to shop once a week and takes them home again. Yarilena does not have its own bus.

Yarilena residents pay full retail costs for electricity at the rate of approximately $30 per week. Households purchase bottled gas as needed, pay phone bills and line rentals, and pay house rental costs of $45 per week, $5 of which is allocated to water. Rent is paid to the Community Housing Association to cover house maintenance and repairs. These costs are detailed in Table 6.10.

Schooling costs

Families on low incomes are eligible for a School Card. Eligibility for the School Card is generally dependent on the parent, guardian or adult student being able to provide documentation attesting to their income level, for example: Parenting Payment, Single Pension Card or other evidence. A number of families at Yarilena send their children to the Lutheran school in Ceduna, where the annual fees are $500 for the first child and $400 per child thereafter. For two children this amounts to a total of $900 per year. An enquiry to the school stated that for School Card holders this would be reduced to $450 per year for two children or $8.65 per week. There is also a public school in Ceduna where many families send their children. We have not included private school costs in our calculations because of the provision of public schooling close to Yarilena. School Cards cancel out school fees for public schooling.

Table 6.10: Selected travel, utility and rental costs for the hypothetical family

Item	Cost per week $	Annual cost $
Electricity per household	30.00	1,560.00
Gas bottles	8.00	420.00
Phone (most have STD bar)	20.00	1,040.00
Rent	40.00	2,080.00
Car repayments	41.38	2,151.76
Car registration	11.23	583.96
Petrol	60.00	3,120.00
Additional car costs (includes tyres and repairs)	20.00	1,040.00
Water	5.00	260.00
Total	**235.61**	**12,255.72**

Child care costs

Child care for one child at Ceduna Crossways Childcare Centre costs $180 per week for a 50-hour week, and in focus group discussions some parents indicated that they do use the centre. While the hypothetical family would be eligible for a proportion of the Child Care Benefit which is paid directly to the child care centre to reduce the fee charged, we have not calculated an amount for child care as CDEP participants are paid for a maximum of only 16 hours of work per week.

3 For an ANZ $5000 car loan at a fixed interest rate of 12.49% over three years, repayments will be $82.76 per fortnight. Over a two-year term, repayments will be $115.44 per fortnight.

Medical and associated health costs

People receiving family tax benefit Part A and/or Parenting Payment are eligible for a Health Care Card. The hypothetical family at Yarilena qualifies for this. Health Care Card holders pay $4.70 per prescription medicine up to the threshold of $253.80. This represents 54 Pharmaceutical Benefit Scheme (PBS) prescriptions, after which point medications are free, providing they are the least costly brand on the PBS schedule. Enquiries to the Ceduna Aboriginal Health Service identified that the service provides free pharmaceuticals at the health clinics for Aboriginal people regardless of whether they hold a Health Care Card or not. Health Care Card holders are also eligible for free emergency ambulance travel and some transport concessions. There is also a Patient Assistance Transport Scheme (PATS) which pays for patients to travel to specialist appointments. Patients pay an initial $30 and then the scheme pays a kilometre rate for driving to the appointment, or the bus, or a plane fare, if the doctor agrees that this is necessary. In Ceduna there is a school dental service and occasionally a visiting dentist but generally adults need to seek dental care elsewhere. PATS does not cover the cost of transport for dental care. We have allowed an amount of $252 for petrol per year for two trips to and from Port Augusta for dental treatment (one trip per adult) and $240 for four nights accommodation (two per trip). Two nights accommodation have been provided to enable the patient to have one dental appointment and one dental hygienist appointment per year. Medical costs are outlined in Table 6.11. According to the *Red Book* (2006) a 10-year-old car is likely to use between 9 and 11 litres per 100 kilometres. This would be around $12.60 if petrol was $1.40 per litre. Eye tests are free through Medicare, but prescription glasses average $260 per pair and ideally should be replaced every two years. We have allowed for the replacement of one pair of glasses every two years, so that every fourth year each adult can buy a new pair.

Table 6.11: Weekly and annual medical and associated costs for the hypothetical family

Item	Cost per week $	Annual cost $
PBS prescriptions up to threshold for one family	Nil	Nil
Minimum dental care for two adults	4.61	240.00
Glasses–one pair per adult every four years	2.50	130.00
Travel and accommodation Port Augusta	9.47	492.00
Total	**16.58**	**862.00**

If patients need to travel to hospital in Adelaide they may be able to claim some accommodation expenses through the Aboriginal liaison officers at the hospital. Ceduna hospital does not deliver babies so there is assistance available for mothers to travel to major centres and for accommodation while they await the birth of their children. However, it must be realised that such events are not cost neutral, neither to the woman awaiting the birth of her child in a town where she may or may not have any relatives, nor to the family left at home in Yarilena.

Creation of a family menu and costing of items at local stores

Focus group members divided items into groups that were bought weekly (Appendix 10), fortnightly or monthly. From the shopping lists, a price survey of supermarket items was conducted in May 2006 at Ceduna Foodland. Shopping list prices included a food list and a health consumables list. The same shopping lists were priced at the Adelaide Pasadena Foodland Supermarket in May 2006 for comparison. To gain an average weekly cost of food and health consumables the cost of items bought fortnightly or monthly have been divided by 2 and 4 respectively, and added to the cost of weekly purchases. A varied selection of brands, including generic brands, was included in the shopping lists to reflect the variety of brands that people in focus groups stated that they buy.

The focus group of three women from the settlement stated that the average cost of food shopping each week for households would be around $200 with an additional $50 or $60 spent on health consumables. In the focus group it was stated that even though some households did not have children, their costs were similar as children and grandchildren regularly visit and have something to eat at their parents' or grandparents' homes. Snacks bought, including school lunches, cost households approximately an additional $15 per week.

The estimated spending each week on food, including snacks in town and school lunches, for the hypothetical family was $238.25. The shopping list of food and health consumable items from Ceduna and cost comparisons with Adelaide Pasadena Foodland can be found in Appendix 10, and the menu from which the shopping list was derived in Appendix 11.

Identification of health consumables and health hardware

In keeping with the Tregenza and Tregenza (1998) methodology, health consumables and health hardware items have been included in the cost of living of the hypothetical family. Products were costed at Ceduna Foodland. The estimated cost to the hypothetical family for health consumables is $61.79 per week. This amount consists of items that are purchased weekly, fortnightly and monthly. Fortnightly and monthly items were totalled and divided by 2 or 4 before being added to the weekly purchases. As a result, the weekly expenditure for health consumables was estimated to be $61.79.

Health hardware items are usually purchased at shops in Ceduna. Items less commonly purchased, such as brooms, mops, buckets and cooking utensils, crockery and cutlery are generally purchased either at Foodland or at Thrifty Link. Blankets and other bedding are purchased at Great Outdoors and white goods such as kettles, toasters, refrigerators, washing machines, irons, electric frying pans and microwaves are either purchased new from Betta Electrical or second hand from Olga Mae's. Most houses are equipped with a gas heater and stove. White goods are a major expense for householders. The cost for white goods has been estimated with length of life of the item in mind so that the cost of replacement is included. For example new jugs and toasters are estimated to be replaced every four years, while fridges and washing machines are replaced about every eight years if bought new, and every two years if bought second hand. The average cost of health hardware for the hypothetical family is $15.11 per week. Table 6.12 shows these costs.

Clothing costs

Yarilena focus group participants state that they try to avoid buying clothes in Ceduna as they say they are expensive. Instead, they travel to Port Lincoln every three or four months, or occasionally Port Augusta or Adelaide to shop at department stores such as K-Mart and Target. Clothes may be put on lay-by on these trips and sent to the buyer when paid off. However, they do buy some clothes in Ceduna – particularly items that children may need in a hurry such as sports clothes.

Table 6.12: Estimated weekly and annual costs for food, health consumables, health hardware and clothing

Item	Cost per week $	Annual cost $
Food: weekly shop, school lunches, snacks in town	238.25	12,389.00
Health consumables	61.79	3,213.08
Clothing	30.00	1,560.00
Health hardware	15.11	785.72
Total	**345.15**	**17,947.80**

Note: At Yarilena, May 2006

An estimation of the weekly expenditure of the hypothetical family

Table 6.13 provides a list of average weekly and annual expenses for the hypothetical family at Yarilena in 2006. The hypothetical family income at Yarilena is estimated to be $609.75 ($31,707.00 per annum) with an estimated weekly spending of $597.34 ($31,065.68 per annum) on basic weekly items. This represents 97.9% of the family's income. These calculations do not include travel to funerals, holidays, Christmas and birthday gifts, family celebrations such as weddings, or family related emergencies. Other costs also not included in the budget are purchase of Austar, but travel to sporting activities is included. Cigarettes, alcohol, household furnishings and personal care such as hairdressing, are not included. These figures also do not include the cost of pets. While it may be assumed that dogs might eat family left-overs, it would be necessary to buy some dog food either from the supermarket or butcher.

Comparison of grocery prices in Ceduna and in Adelaide

The prices for food and health hardware items at Ceduna were compared with prices for similar items in Adelaide in May 2006. Table 6.14 and Appendix 12 outline the weekly costs of food and health consumable items for Yarilena and Adelaide and also give a percentage mark-up on prices between the two localities.

Percentage differences in food and health consumable prices between Ceduna Foodland and Adelaide's Pasadena Foodland showed that:

Percentage difference on weekly shopping items was approximately 19.8%

Percentage difference on health consumable items was approximately 21.8%

Table 6.13: Average weekly and annual expenses for a hypothetical family

Item	Cost per week $	Annual cost $
Food	223.25	11,609.00
Health consumables	61.79	3,213.08
School lunches, snacks, weekend sport	15.00	780.00
Fuel	60.00	3,120.00
Additional car costs	72.61	3,775.72
Electricity	30.00	1,560.00
Gas	8.00	420.00
Phone	20.00	1,040.00
Rent	40.00	2,080.00
Water	5.00	260.00
School	Nil	
Childcare	Nil	
Health hardware items	15.11	785.72
Prescriptions, glasses, dental (plus travel)	16.58	862.16
Clothing	30.00	1,560.00
Total	**597.34**	**31,065.68**

Table 6.14: Comparison of costs and percentage differences between Adelaide and Yarilena

Food costs $		Health consumables costs $	
Yarilena total weekly costs for food and non-alcoholic drinks, (excludes school lunches and snacks in town)	223.25	Yarilena total weekly cost for health consumables	61.79
Adelaide total weekly cost for similar food excluding school lunches and snacks in town	186.32	Adelaide total weekly cost for health hardware consumables	50.73
Difference in weekly costs for food	36.93	Difference in weekly costs	11.06
Percentage mark-up for food for Yarilena residents	19.8%	Percentage mark-up for Yarilena residents for health consumables	21.8%

Note: For weekly food items and health consumables for a family of two adults and two children under 16

The impact of additional costs such as water charges on the wellbeing of Yarilena residents

This analysis has used a hypothetical household from Yarilena. The weekly income has been derived from CDEP figures and has assumed two adults in receipt of this wage. While this may be an under-estimation of the income of families in mainstream employment, it is an over-estimation of income for those families at Yarilena whose income is limited to either a disability or aged pension who have responsibility for children. The analysis has also confined income estimations to the family unit, rather than households. While households may generate more than the $609.75 per week, our research indicates that it is erroneous to assume that household costs are shared equally by householders in Aboriginal settlements.

Approximately 97.9% of income is spent on weekly living expenses excluding any luxuries. However, what is also evident is that while families expend approximately 98% of their income on essential food and health consumables, the income set for the hypothetical family is higher than that set for Nepabunna settlement discussed in Chapter four. While it is a truism that family expenses and life-style rise to meet existing income, it is also true that the income and diet for Nepabunna residents was sub-optimal. Families at Yarilena consume a healthier diet, with a larger amount of fresh fruit and vegetables than families at Nepabunna. This is due in part to close proximity to a town with a regular supply of fresh fruit and vegetables and also to a higher income than Nepabunna residents. Nonetheless the Yarilena hypothetical household pays nearly 98% of their weekly income towards day-to-day living costs and there is little money left each week for luxuries, recreation or saving for emergencies or leisure pursuits. While 50% of families possibly earn more than the amount of the hypothetical family they may also incur additional expenses such as child care. This would especially be so for those families in mainstream employment. Assumptions that large extended families provide childcare are misplaced. As Hunter (2002a) notes, these arrangements do not necessarily suit mainstream labour market hours of employment.

Excess water costs at Yarilena are met by profits from community enterprises. This is only possible while the enterprise sustains a healthy profit. Over the last two years Yarilena has been paying significant amounts for water that has leaked from pipes. This problem is due to factors outside the community's control – factors related to the pressure incompatibility of their internal pipeline with that of the SA water mains pipeline, outlined in more detail in Chapter seven. This problem has strained the population financially and has meant money has not been available to develop other aspects of the settlement. The Yarilena residents have worked hard to rectify the situation and have strived to reduce water consumption. A proposal for the community to reduce existing water related costs is outlined in Chapter seven.

Cost of living at Scotdesco: Introduction

Scotdesco is located approximately 96 kilometres west of Ceduna. It is a wheat and sheep farming property, but is described as 'opportunist cropping' because of the small farm size and unreliable rainfall. There are 14 dwellings. The settlement receives a $134,000 municipal services grant per annum to cover wages for the municipal services officer and their 'municipal' services such as maintaining the water supply, dog control, dust control, rubbish collection, and environmental health programmes. Up until the 2005/2006 budget Scotdesco received $154,000 for these services, but for the 2006/2007 budget they were asked to raise the $20,000 'shortfall' through household water charges.

Construction of a hypothetical family at Scotdesco

The data sources used for Scotdesco are the 2001 Australian Census published by the ABS, data from the National Aboriginal Health Strategy R3 Project Impact Assessment 2005 (Parsons Brinckerhoff 2005) and data gathered during this study as part of the water audit and focus group discussions. The period of data collection was June 2006 to December 2006.

Scotdesco population

In terms of the ABS Australian Indigenous Geographical Classification, Scotdesco is one of five Indigenous Locations (ILOCs) which make up the Indigenous Area (IARE) known as West Coast Indigenous Area, namely Scotdesco, Oak Valley, Yalata, Eyre Peninsula and West Coast remainder. According to the 2001 ABS Census, the population of Scotdesco was 57, with 94.7% (54) of these identified as Aboriginal and the remaining 5.3% (3) being non-Aboriginal (Table 6.15). In 2001 the settlement comprised more males than females (35 males, 22 females). The ABS population data are further supported by data from the NAHS Project Impact Assessment 2005 which indicated that the settlement comprised 55 people.

Table 6.15: Population of Scotdesco

Aboriginal			Non-Aboriginal			Total		
Males	Females	Total	Males	Females	Total	Males	Females	Total
35	22	57	3	0	3	3	35	38

Source: ABS 2002

In contrast, community collected data (June 2006) for the Aboriginal population shows a significant reduction in this number to a total of 37 people: 22 males, 15 females. At a community meeting in June 2006, the community employed office worker stated that the population is changeable with people regularly moving to Ceduna and back to Scotdesco. For example, on 17 August 2006 the population was 42 rather than 37 according to the office worker. Focus group members suggested that this population movement was associated with people following CDEP work. This means that when this work is available at Scotdesco there is a population influx with people from other settlements taking up the opportunity for work. This is supported by NAHS Project Impact Assessment 2005 data which reports that there were 71 participants in CDEP, 55 being Scotdesco residents, while the remainder were from other settlements.

Age composition

At the time of 2001 ABS Census, the age composition of the Aboriginal population of Scotdesco featured a predominance of adults with only a small number of young children present in the settlement, specifically six children in the age group 0–14 (Table 6.16). Indeed, the median age reported by the ABS for the settlement in 2001 was 33 years. Overall, males outnumber female adults in the settlement. Further data relating to age composition was collected by Scotdesco settlement members in August 2006 and is presented in Table 6.17. It can be seen that the number of children in the settlement remains low.

Table 6.16: Age composition of the Aboriginal population at Scotdesco, 2002

	Male	Female	Total
0–4 years	0	3	3
5–14 years	3	0	3
15–24 years	12	3	15
25–44 years	15	6	21
45–64 years	3	6	9
65+ years	3	3	6
Total	**36**	**21**	**57**

Source: ABS 2002

Table 6.17: Age composition of the Aboriginal population at Scotdesco, 2006

	Male	Female	Total
0–4 years	0	1	1
5–14 years	0	0	0
15–24 years	7	3	10
25–44 years	9	6	15
45–64 years	4	3	7
65+ years	2	2	4
Total	**22**	**15**	**37**

Source: Community collected data, August 2006

Comparing Tables 6.16 and 6.17 shows that most change has occurred in the 15–24 and 25–44 year age brackets. While the number of females has remained the same in these age groups, the number of males in the 15–25 year age bracket has decreased by 42 % while males in the 25–44 year age bracket have decreased by 40 %. These ages represent the greatest number of people in the workforce and reflect perhaps the seasonal nature of work, and the fact that people (particularly males) come to Scotdesco for short periods for employment but may not stay permanently.

Household size

The ABS Census 2001 indicated that the mean household size for the Aboriginal population of Scotdesco was 2.6. Although not providing a specific measure of household size, NAHS data (Parsons Brinckerhoff 2005) indicated that the population of 55 was spread across 14 houses thereby resulting in a population density measure of 3.6 (55/14).

The data shown in Table 6.18 present a detailed picture of the composition of households at Scotdesco in June 2006. Based on this data, it is possible to calculate a mean household size of 2.3 people. However, more in-depth examination reveals that the composition of households is highly variable and suggests that for the purposes of this study it would be useful to consider the income scenario generated from three hypothetical family compositions:

1. two adults and no children under 15 years of age
2. three adults and no children under 15 years of age
3. one adult and no children under 15 years of age

Table 6.18: Household size at Scotdesco in June 2006

House number	Number of adults	Number of children aged under 15 years	Number of children aged 15–19 years
1	3	0	0
2	3	0	1
3	1	0	0
4	2	0	0
5	2	0	0
6	1	0	0
7	1	0	1
8	1	0	0
9	3	0	0
10	3	0	1
11	3	1	1
12	3	0	1
13	1	0	0
14	1	0	0
15	1	0	0
16	2	0	0
Total	**31**	**1**	**5**

Source: Community collected data, June 2006

Calculating the income of the hypothetical family

Employment opportunities at Scotdesco

Employment opportunities for Aboriginal people at Scotdesco are generated predominantly by CDEP. Table 6.19 shows that 90% (26) of the Aboriginal labour force were participants in CDEP at the time of the 2001 Census and a further 10% (3) were employed in other areas. Children in the 15–19 age group appear to be in the labour force. More recent data collected by the community is shown in Table 6.20. Again it indicates that there is continued reliance on participation in CDEP for employment.

Table 6.19: Employment of Aboriginal People in Scotdesco 2002

	Males	Females	Total
Employed CDEP	14	12	26
Employed other	3	0	3
Total labour force	17	12	29
Not in the labour force	6	3	9
Unemployment rate	0	0	0

Source: ABS 2002

Table 6.20: Employment in Scotdesco 2006

	Males	Females	Total
Employed CDEP	16	11	27
Employed other	2	0	2
Unemployed	2	1	3
Total labour force	20	12	32
Not in the labour force	2	2	4

Source: Community collected data, June 2006

Income derived from CDEP and other employment at Scotdesco

Key sources of income in Scotdesco include wages derived from CDEP or mainstream forms of work, and Centrelink benefit payments. Table 6.21 provides a comparison of the median weekly income at the level of the individual and family for Scotdesco and the other Indigenous Locations within the Indigenous Area (IARE) of West Coast. Individual weekly income indicates the gross income derived from sources such as wages, salary, pensions, unemployment benefits, family allowances, student allowances and maintenance, that a person usually receives each week. Family income is the sum of individual incomes of each resident family member aged 15 years and over who is present in the household on census night. Family income is not applicable to non-family households, such as group households or lone person households; or to people in non-private dwellings. Individual incomes are collected as ranges in the census. To enable these range values to be summed, information from the Survey of Income and Housing Costs, which collects income as individual values, is used to estimate the median income within each bracket collected by the census. The relevant median value for each family member is then summed to produce the family income figure.

Table 6.21: Median weekly income for Indigenous Locations in the West Coast Indigenous Area

Indigenous Location	Median weekly individual income $		Median weekly family income $		Median weekly rent $	
	Aboriginal	Non-Aboriginal	Aboriginal	Non-Aboriginal	Aboriginal	Non-Aboriginal
Scotdesco	160–199	n.a	500–599	n.a.	1–49	n.a.
Oak Valley	160–199	800–999	300–399	1500–1999	1–49	n.a.
Yalata	160–199	700–799	400–499	1200–1499	1–49	1–49
Eyre Peninsula	200–299	300–399	600–699	600–699	100–149	50–99
West Coast: remainder	120–159	400–499	400–499	700–799	n.a.	50–99

Source: ABS 2002

At the time of the 2001 ABS Census, the individual income level at Scotdesco was $160–199. Similarly, the two other small Aboriginal settlements in the West Coast IARE, Oak Valley and Yalata, shared this median weekly individual income. In addition, Aboriginal people living in Ceduna, the closest major service centre to Scotdesco, had a weekly median income level of $160–199 so the individual income situation for all these settlements falls within the same range.

The median weekly family income level for Aboriginal people varies significantly across the Indigenous Locations in West Coast IARE. Scotdesco had a median weekly income of $500–599 which is higher than Oak Valley ($300–399), Yalata ($400–499) and West Coast remainder ($400–499). The Indigenous Location of Eyre Peninsula has the highest median weekly family income at $600–699. Aboriginal people living in Ceduna have a median weekly family income of $600–699

as well. House rental costs, one of the primary ongoing expenses to be deducted from income, are also shown in Table 6.21. In Scotdesco, the rent paid by Aboriginal people falls at the lower end of the scale ($1–49) reflecting the lower income levels in the community.

The customary economy at Scotdesco

At Scotdesco the weekly diet is supplemented through seasonal hunting trips. Animals hunted include kangaroo, sleepy lizard, wombat, fish and lobster. Hunting contributes regularly to individual's diets, but it has not been counted in income, nor have the costs of hunting such as petrol, gun licences and ammunition been costed. When talking about hunting, one member of a focus group said that hunting contributed to residents' ability to eat a healthy diet, but that the type of food available varies with the seasons.

The hypothetical family income

Calculations for the hypothetical families used CDEP rates as outlined in the *CDEP Guidelines 2006–07* and Centrelink payment rates from the *Guide to Australian Government Payments 20 September to 31 December 2006*.

As Scotdesco falls within the Australian Taxation Office Special Zone B each person also receives a remote area allowance. The remote area allowance rates are: $18.20 per fortnight (for one adult); $15.60 per fortnight for each person (couple rate); and $7.30 per fortnight for each child (dependant rate).

For the hypothetical family structure of two adults deriving income from CDEP with no children, the total income is $507.22 per week as shown in Table 6.22.

Table 6.22: Calculation of the income for hypothetical family 1

CDEP	$235.41 x 2	$470.82
CDEP supplement	$10.40 x 2	$20.80
Remote area allowance	$7.80 x 2	$15.60
Total weekly income	**$507.22**	

Household 2: Where the household consists of 3 adults who are CDEP participants (single) and no children, the total income is $764.73 per week as shown in Table 6.23

Table 6.23: Calculation of the income for hypothetical family 2

CDEP	$235.41 x 3	$706.23
CDEP supplement	$10.40 x 3	$31.20
Remote area allowance	$9.10 x 3	$27.30
Total weekly income	**$764.73**	

Household 3: Where the hypothetical household is one adult deriving income from CDEP and no children, the total income is $254.91 per week as shown in Table 6.24.

Table 6.24: Calculation of the income for hypothetical family 3

CDEP	$235.41	$235.41
CDEP supplement	$10.40	$10.40
Remote area allowance	$9.10	$9.10
Total weekly income	**$ 254.91**	

Establishing the cost of living for hypothetical family 1 (two adults on CDEP)

Travel, utility and rental costs

Scotdesco residents pay for electricity, water, gas, telephone, rent and purchases of household goods as well as fuel and car costs. According to focus group participants most households at Scotdesco have a car for travel to Ceduna for shopping, but there is also a community bus that takes people shopping once a week at no cost to the individual. Most households do a large supermarket shop at Foodland once per week. Households also buy health consumables fortnightly at Ceduna Foodland. All householders pay $45 per week for rent and $5 water charges for the primary householder. Additional householders pay $10 each per week towards water costs. Table 6.25 is an approximation of regular expenditure per household for utilities, based on information gained from Scotdesco community members in focus groups. Most householders have car repayments, and on average the petrol costs would be about $56 per household per week (Table 6.26). These costs do not include travel for medical reasons.

Medical and associated health costs for hypothetical family 1

All of the hypothetical households at Scotdesco are eligible for a low-income Health Care Card. According to the Ceduna-Koonibba Aboriginal Health Service, Health Care Card holders are eligible for free emergency ambulance travel and some transport concessions (including the PATS scheme). We have allowed an amount of $252 for petrol per year for two trips to and from Port Augusta for dental treatment (one trip per adult) and $240 for four nights accommodation (two per trip). The travel expenses have been costed in the same way as for Yarilena, and travel costs based on rates given in the *Red Book* (2006)—the results are given in Table 6.27. We have allowed for the replacement of one pair of glasses every two years so each adult can buy a new pair every four years.

Table 6.25: Selected utility costs for household 1

Item	Cost per week $	Annual cost $
Electricity per household	23.00	1,196.00
Gas bottles	6.92	360.00
Phone	20.00	1,040.00
Rent (same rent for all dwellings)	45.00	2,340.00
Water	15.00	780.00
Total for utilities	**109.92**	**5,716.00**

Table 6.26: Travel costs for hypothetical family 1

	Cost per week $	Annual cost $
Car repayments	41.38*	2,151.76
Car registration	11.23	583.96
Petrol	56.00	2,912.00
Additional car costs including tyres and repairs	20.00	1,040.00
Total for travel	**128.61**	**6,687.72**

* For an ANZ $5000 car loan at a fixed interest rate of 12.49% over 3 years, repayments will be $82.76 per fortnight.

Table 6.27: Weekly and annual medical costs for hypothetical family 1

Item	Cost per week $	Annual cost $
PBS prescriptions up to threshold for household	Nil	Nil
Minimum dental care for two adults	4.61	239.72
Glasses–one pair per adult every four years	2.50	130.00
Travel and accommodation Port Augusta	10.01	520.52
Total	**17.12**	**890.24**

Creation of a family menu and costing of items at local stores

Weekly menu and shopping list

The method of compiling a weekly menu (Appendix 13) and shopping list (including health consumables, Appendix 14) was consistent across the four settlements in the project and was based around what people in the focus group stated that they and their family ate, and guided by the *Australian Guide to Healthy Eating* (AGHE) serve sizes. The nearest supermarket for Scotdesco residents is Ceduna Foodland.

Survey of the cost of food for the weekly menu

Weekly food costs at Scotdesco came to $135.22, health consumables to $33.66 (Table 6.28) and clothing to $20 per week. As for the other settlements in this study, where focus group participants stated a particular brand for an item these brands have been priced. If brands were not specified a varied selection of brands including generic brands have been priced. Items from the shopping list were priced at Ceduna Foodland and the Adelaide Pasadena Foodland Supermarket in September 2006 (Table 6.29).

Table 6.28: Comparison of costs between Adelaide and Scotdesco

Weekly food costs (excluding school lunches and snacks in town) $		Weekly health consumables costs $	
Scotdesco	135.22	Scotdesco	33.66
Adelaide	119.65	Adelaide	26.45
Difference in weekly costs	15.57	Difference in weekly costs	7.21
Mark-up for food for Scotdesco residents	13.0%	Mark-up for health consumables for Scotdesco residents	27.2%

Note: For weekly food and health consumables for hypothetical family 1 (two adults)

Health hardware costs

Householders are responsible for purchase of their own white goods. For heating, most households use wood fires and gas for cooking. They may supplement wood heating with electric heaters. Some houses have reverse cycle air conditioning. Refrigerators and washing machines are bought second hand from Olga Mae's (Ceduna) or if households can afford new ones they will be purchased for $800–$1000. Second hand white goods last a few years while new ones last around 10–15[4] years for refrigerators and up to 10 years for washing machines. Televisions can be bought for between $300–$500 from Betta Electrical or Retravision in Ceduna. Pots and crockery are purchased at Thrifty Link (Ceduna) or second hand. Linen is bought at Home Scene (Ceduna) or second hand.

The weekly income for hypothetical family 1 at Scotdesco was estimated to be $507.22 with an estimated basic weekly spending on essentials of $474.65 (Table 6.30); this leaves $32.57 or $16.29 per person per week.

4 The estimated life of white goods differed between communities.

Table 6.29: Comparison of total supermarket costs for hypothetical family 1

Scotdesco weekly total cost of food and health consumables for hypothetical household 1 (2 adults)	$168.88
Adelaide total weekly cost of food and health consumables	$146.10
Difference in weekly costs	$22.78
Percentage mark-up in Ceduna	15.6%

Table 6.30: Average weekly and annual costs for the hypothetical family 1

Item	Cost per week $	Annual cost $
Food and health consumables	168.88	8,781.76
Snacks in town	15.00	780.00
Car costs	128.61	6,687.72
Rent	45.00	2,340.00
Water	15.00	780.00
Electricity	23.00	1,196.00
Gas	6.92	360.00
Phone	20.00	1,040.00
Health hardware items	15.12	786.22
Prescription medicines, glasses, dental	17.12	890.24
Clothing	20.00	1,040.00
Total	**474.65**	**24,681.94**

Cost of living for hypothetical family 2 (three adults)

Hypothetical family 2 comprises three adults. The way the prices were determined in the previous sections (for two adults) does not differ, but in the sections to follow the same costs are multiplied by three rather than two. Table 6.31 shows the income of the three-adult family, while Tables 6.32 and 6.33 show their expenditure on utilities and travel costs.

Table 6.31: Income of hypothetical family 2

CDEP	$235.41 x 3	$706.23
CDEP supplement	$10.40 x 3	$31.20
Remote area allowance	$9.10 x 3	$27.30
Total weekly income	**$764.73**	

Table 6.32: Selected utility costs for the hypothetical family 2

Item	Cost per week $	Annual cost $
Electricity per household	34.50	1,794.00
Gas bottles	10.50	540.00
Phone	20.00	1,040.00
Rent	45.00	2,340.00
Water (+10.00 per additional person)	25.00	1,300.00
Total for utilities	144.90	7,534.00

Table 6.33: Scotdesco travel costs for hypothetical family 2

Item	Cost per week $	Annual cost $
Car repayments	41.38	2,151.76
Car registration	11.23	583.96
Petrol	56.00	2,912.00
Additional car costs including tyres and repairs	20.00	1,040.00
Total for travel	**128.61**	**6,687.72**

The amounts for electricity and gas have been increased by a third but telephone and rent are unchanged. Water costs an extra $10 for an additional person. Travel costs the same for the one, two or three person households as car costs and registration are the same and the distance to travel for shopping is the same. Food and health consumable costs, the cost of health hardware, medical costs (Table 6.34) and clothing have been increased by a third (for the additional person). The income of three adults on CDEP was estimated to be $764.73 with an estimated basic essential weekly spending of $627.70 (Table 6.35). This leaves a surplus of $137.03 or $45.68 per person per week. Tables 6.36 and 6.37 provide a comparison of expenses between Scotdesco and Adelaide.

Table 6.34: Weekly and annual medical costs for hypothetical family 2

Item	Cost per week $	Annual cost $
PBS prescriptions up to threshold for household	Nil	Nil
Minimum dental care for three adults	6.92	359.84
Glasses: one pair per adult every four years	3.75	195.00
Travel and accommodation Port Augusta	15.02	781.04
Total	**25.69**	**1,335.88**

Table 6.35: Average weekly and annual expenses for hypothetical family 2

Item	Cost per week $	Annual cost $
Food and health consumables	253.32	1,3172.64
Snacks in town	22.50	1,170.00
Car costs	128.61	6,687.72
Rent	45.00	2,340.00
Water	25.00	1,300.00
Electricity	34.50	1,794.00
Gas	10.40	540.00
Phone	20.00	1,040.00
Health hardware items	22.68	1,179.36
Prescription medicines, glasses, dental	25.69	1,335.88
Clothing	30.00	1,560.00
Total	**627.70**	**32,639.60**

Table 6.36: Comparison between Adelaide and Scotdesco of costs

Food costs $		Health consumables $	
Scotdesco total weekly costs for food excluding school lunches and snacks	202.83	Scotdesco total weekly cost for health consumables	50.49
Adelaide total weekly cost for similar food excluding school lunches and snacks in town	179.49	Adelaide total weekly cost for health hardware consumables	39.69
Difference in weekly costs	23.34	Difference in weekly costs	10.80
Percentage mark-up for food for Scotdesco residents	13.0%	Percentage mark-up for Scotdesco residents for health consumables	27.2%

Note: For weekly food and health consumable items for hypothetical family 2 (three adults)

Table 6.37: Comparison of total supermarket costs for hypothetical family 2

Scotdesco total weekly market costs for hypothetical household 2 (three adults)	$253.32
Adelaide total weekly market costs	$219.18
Difference in weekly costs	$34.14
Percentage mark-up in Ceduna	15.6%

Note: And percentage difference between Adelaide and Scotdesco prices

Cost of living for hypothetical family 3 (comprising one adult)

One adult living at Scotdesco will earn around $254.91 per week (Table 6.38). The amount spent on electricity and gas has been halved because one person generally lives in a smaller dwelling than larger families. The amount for telephone has remained unchanged, as has rent, which at $45 per week, is uniform throughout Scotdesco (Table 6.39). A single person household pays $5 a week towards water. Travel costs (Table 6.40) are likely to be similar regardless of the number of people in the household.

Table 6.38: Income of hypothetical family 3 (one adult)

CDEP	$235.41
CDEP supplement	$10.40
Remote area allowance	$9.10
Total weekly income	$254.91

Table 6.41 outlines typical medical costs for an adult living in Scotdesco. It is estimated that weekly expenses for an adult living at Scotdesco is around $331.63 (Table 6.42), which exceeds income ($254.91, Table 6.38) by $76.72. To live within their means a person living alone at Scotdesco would need to forego some of the previously listed items. For example, if a single person did not have car expenses then their weekly expenses would amount to $203.02 per week leaving a surplus of $51.89.

Table 6.39: Utility costs for one adult at Scotdesco

Item	Cost per week $	Annual cost $
Electricity per household	11.50	598.00
Gas bottles	3.46	180.00
Phone	20.00	1,040.00
Rent	45.00	2,340.00
Water	5.00	260.00
Total for utilities	**84.96**	**4,418.00**

Table 6.40: Travel costs for one adult at Scotdesco

Item	Cost per week $	Annual cost $
Car repayments	41.38	2,151.76
Car registration	11.23	583.96
Petrol	56.00	2,912.00
Additional car costs (tyres and repairs)	20.00	1,040.00
Total for travel	**128.61**	**6,687.72**

Table 6.41: Medical and associated costs for one adult at Scotdesco

Item	Cost per week $	Annual Cost $
PBS prescriptions up to threshold for household	Nil	Nil
Minimum dental care for one adult	2.31	120.12
Glasses: one pair every two years	1.25	65.00
Travel and accommodation Port Augusta	5.00	260.00
Total	**8.56**	**445.12**

Table 6.42: Average weekly and annual expenses for one adult at Scotdesco

Item	Cost per week $	Annual cost $
Food and health consumables	84.44	4,390.88
Snacks in town	7.50	390.00
Car costs	128.61	6,687.72
Rent and water	50.00	2,600.00
Electricity	11.50	598.00
Gas	3.46	180.00
Phone	20.00	1,040.00
Health hardware items	7.56	393.12
Prescription medicines, glasses, dental	8.56	445.12
Clothing	10.00	520.00
Total	**331.63**	**17,244.84**

*Food costs have been calculated to be half the cost of the two person household.

Percentage of household income spent on basic essentials and comparative costs with Adelaide

Statistics from the ABS Household Expenditure Survey (HES) 2003–2004 (ABS 2005) indicate that households ranked as having the lowest 20% of income spend approximately $412 per week on goods and services. As we noted in the section on Yarilena, the significant factor for Aboriginal householders is the higher number of people per house. While the data suggest that this varies for Scotdesco, the figures demonstrate that those in single households do not earn enough to meet essential living costs. This HES report notes that households that rely on government pensions and allowances on average spend $455 per week on goods and services (ABS 2005, p. 5). The overall increase in the household expenditure for goods and services between 1998–1999 and 2003–2004 was $184. Of significance to the Scotdesco community is the 32% increase in domestic fuel and power and the 26% increase in petrol costs. Scotdesco community pays full retail price for electricity. Appendix 15 provides a comparison of the costs between Scotdesco and Adelaide.

Table 6.43: Weekly expenses for each hypothetical family at Scotdesco and percentages of weekly income

	Household 1: 2 adults Weekly income: $507.22		Household 2: 3 adults Weekly income: $764.73		Household 3: 1 adult Weekly income: $254.91	
	Cost per week $	% of family income	Cost per week $	% of household income	Cost per week $	% of household income
Food and non-alcoholic beverages	135.22	26.7	202.83	26.5	67.61	26.5
Snacks in town	15.00	2.9	22.50	2.9	7.50	2.9
Health consumables	33.66	6.6	50.49	6.6	16.83	6.6
Fuel	56.00	11.0	56.00	7.3	56.00	22.0
Additional car costs	72.61	14.3	72.61	9.5	72.61	28.5
Electricity	23.00	4.5	34.50	4.5	11.50	4.5
Gas	6.92	1.4	10.40	1.4	3.46	1.4
Phone	20.00	3.9	20.00	2.6	20.00	7.8
Rent	45.00	9.9	45.00	6.5	45.00	17.7
Water	15.00	2.0	25.00	3.9	5.00	2.0
Health hardware	15.12	3.0	22.68	3.0	7.56	3.0
Medical	17.12	3.4	25.69	3.4	8.56	3.4
Clothing	20.00	3.9	30.00	3.9	10.00	3.9
Total	**$474.65**	**93.5%**	**$627.70**	**82.0%**	**$331.63**	**130.2%**

The impact of additional costs such as water on the wellbeing of Scotdesco residents

The data illustrate that between 52.8% and 86.5% of household income for the hypothetical households is expended on food, health consumables and transport (household 1: 61.5%, household 2: 52.8%, household 3: 86.5% – see Table 6.43). Water costs paid by individual community members account for 2 to 4% of household income. While people in Scotdesco who participated in focus groups stated that they ate well and their menus suggest this is the case, little income remains. Single person households fare the worst as expenses for housing and transport are the same as for larger families where costs are shared between two or three people. It is difficult to imagine how single person households do survive with the expenses they incur each week unless they do without major items such as a car. This must pose difficulties due to the distance of Scotdesco from Ceduna.

Chapter seven: Water use at Yarilena and Scotdesco

Introduction

This chapter presents the findings for two settlements: Yarilena and Scotdesco. The settlements were included in the study for comparative purposes because their water payment arrangements differ from Nepabunna. Yarilena and Scotdesco pay for their water, and the costs related to their water supply impact on their wellbeing. The second research objective, which applies to the two settlements, was to 'promote wellbeing through a reduction in utility stress associated with water services'.

This chapter begins with a brief overview of the nature and quality of the water supply system at Yarilena. The main focus of the chapter is an analysis of the water consumption data and the implications of the findings for Yarilena. A brief discussion of the water supply and use at Scotdesco is given in the latter part of the chapter. Scotdesco had a minor role in the water use component of the study, but given its water supply problems warrants discussion.

Water supply

Yarilena receives water from the Tod-Ceduna supply system that also services Port Lincoln, Ceduna and other towns across Eyre Peninsula. The Tod-Ceduna supply is a fragile resource. The following quotes highlight how not much has changed between 1909 and 2006 in terms of constraints on development as a result of the paucity of water resources in the region:

> *The principal drawback to the occupation of Eyre's Peninsula has been the absence of a good water supply and the difficulty of providing one.*
>
> (South Australian Parliamentary Papers 1909 as cited in Twidale and Smith 1971).
>
> *The economy of the Eyre Peninsula will suffer unless more water is found.*
>
> (Clarke 2005).

Eyre Peninsula's water supply was first developed in 1916 for the purpose of expanding the agricultural sector on Eyre Peninsula. It began as a surface water scheme from the Tod River. The Tod River, the only stream on Eyre Peninsula with reliable flows, proved to be a limited supply, however, and in 1945 groundwater from the Uley-Wanilla Basin (near Port Lincoln) was fed into the Tod system. Since 1945 there have been a number of upgrades to the Tod trunk main (Hammerton 1986), and additional groundwater basins across the Eyre Peninsula tapped to form the Tod-Ceduna supply (Taylor 2003). In 1996 the Tod-Ceduna supply was extended west of Ceduna to Denial Bay and 14 kilometres east of Penong, in what is referred to as the Ceduna-Koonibba pipeline. Water services in Ceduna are administered by SA Water, but the supply to the west of Ceduna is administered by the District Council of Ceduna, and overseen by a board comprising representatives from the District Council of Ceduna, Koonibba Aboriginal settlement, Penong, Far West Corporation and local farmers.

In 2003, as a result of ongoing concerns over the rising salinity of water feeding into the Tod Reservoir, and the failure to meet the drinking water quality guidelines for a number of parameters, the Tod Reservoir with its average salinity of over 2,000 mg/L was taken off line. To reduce the salinity of the surface water supply, SA Water conducted a cost-benefit study of a

number of options, including a pilot desalination pilot plant at the reservoir (Taylor 2003). The study concluded, however, that desalination is the 'least viable option' due to the high energy requirements (ABC News 2005a). The supply now comprises mostly groundwater from a number of small, localised aquifers of varying salinities, accessed across Eyre Peninsula. The salinity of the water reaching Ceduna is around 891 mg/L, but has at times reached 1,500 mg/L. Although the water meets Australian Drinking Water Guidelines in terms of its salinity and disinfection, it is deemed unpalatable by locals who comment 'a lot of people say its drinkable [but it has a] yucky taste' (Willis et al. 2004).

The billing system for water

As with other properties in Ceduna, Yarilena receives SA Water services to the property boundary. Up to 2005/2006, as with the rest of Ceduna, the cost of the first 125 kL of water was $0.44 and thereafter $1.03 per kL; in 2006/2007 the price increased to $0.47 and $1.09 respectively. The 125 kL basic allowance is quickly exceeded as the settlement comprises 15 houses (not one house) and therefore experiences some disadvantage compared to a single property in Ceduna where the same billing system is applied. The tiered billing system is also applied to other multiple household Aboriginal settlements such as Davenport. Yarilena receives one bulk bill for water, and through an internal arrangement each household pays $5 per week towards water, regardless of their water use, as part of their house rent deduction ($40 for rent, $5 for water, as a single $45 deduction).

Water use at Yarilena

Unlike the Nepabunna water use data which have a detailed record of the corresponding resident population in each household at the time of the water meter readings, Yarilena data do not. However, as shown in Chapter six, over the last five years the population has barely changed. Water meter readings from each house are available for a period extending from 24 November 2004 to 19 July 2006 (20.5 months, or 624 days), mostly on an ad hoc basis. During this period readings were taken in November 2004, then monthly between January and April 2005. Readings resumed on 19 April 2006, with eight sets of readings over a three-month period ending on 19 July 2006. The data provide an indication of water use over a sufficiently long period to accommodate brief periodic absences, and provide an indication of seasonal water use. Table 7.1 summarises the average daily per capita domestic water use over the 20.5-month period, during intensive measurement periods and interval periods. The current population of 57 is used in the calculations. The average per capita water use over the 624 days is 208 L/d which is lower than that of Adelaide (268 L/d) and South Australia's country towns (220 L/d) as shown in Table 5.7 (Chapter five), although the latter two figures do not include use of rainwater, which is likely to be small in Adelaide. If one adds estimated rainwater use to the mains consumption of 209 L/p/d at Yarilena, the total water use is likely to be similar to that of country towns.

Table 7.1: Average daily per capita domestic mains water use at Yarilena

Average water use (L/p/d)	Period over which the water use was calculated
208	624 days from 02 November 2004 to 19 July 2006
364	97-day period from 02 November 2004 to 07 February 2005
174	34-day period from 15 June to 19 July 2006
167	14 days from 15 to 29 June 2006 (intensive)
192	8 days from 19 to 27 April 2006 (intensive)
146	4 days from 02 to 06 May 2006 (intensive)

Note: at various times of the year and over a 624-day period

Table 7.2 summarises the per capita water use on a household basis. If one excludes the two households that consistently use the most water from the calculation, the average water use in the remaining 13 houses over the 624-day period is 130 L/p/d. Table 7.2 shows the variation in water use between the houses, but highlights that the majority of houses use low quantities of mains water. For example, houses 3[1] and 6 use only 72 and 64 L/p/d (of mains water) respectively. If the top two water-using households are excluded from the calculations, the water use for summer and winter is 134 L/house/d and 133 L/house/d respectively (as shown in Figure 7.1); where 'summer' is represented by the period 02 November 2004 to 07 February 2005 (97 days); and 'winter' a 34-day period from 15 June to 19 July 2006.

The current use of rainwater

With the exception of two houses that have one rainwater tank, each house at Yarilena has two 18,925 L (i.e. a total storage capacity of 37,850 L) polyethylene rainwater tanks plumbed into the household reticulation to reduce their dependence on the mains water supply. The two houses with one rainwater tank are occupied by one, or at the most two, people and their water requirements are met by one tank. Although the roof capacity has the potential to collect more rain, this would be superfluous to the needs of the occupants (but not the community at large).

The rainwater tanks are connected to the mains water supply so that occupants can use rainwater primarily. There is an automatic mains water feed into the tank so that when the rainwater supply is almost exhausted the pump automatically feeds water from the mains supply into the tanks. In this way the household never runs out of water, but rainwater is used as a first preference. The toilet and laundry are directly linked to the mains water supply (as opposed to the rainwater tank) to prevent any backflow of toilet water into the tank should the water pressure drop.

In addition to household rainwater collection, the office and garage complex has three 20,820 L rainwater tanks (i.e. a total storage of 62,459 L), but the roof can harvest more rain than this. This complex, which is not linked to the mains supply, does not use much water. Excess rainwater is collected from the office block and carted to replenish any empty household tanks.

The community use rainwater for their potable supply and have not experienced any associated health problems. However, following a recent health scare when a dead animal was found in a rainwater tank in Ceduna, the community asked the Aboriginal Health Council at Ceduna to test their rainwater tanks for bacterial contamination, but were told that the sampling could not be done because there were no sample bottles. In the past Aboriginal households could have their tanks tested, free of charge, and the results of the tests were given to the families within a day. It is therefore recommended that this necessary health service be reinstated, particularly given the community's use of rainwater as their potable supply.

Table 7.2: Average daily per capita mains water use in the fifteen houses at Yarilena

House	Water use (L/p/d)	House	Water use (L/p/d)	House	Water use (L/p/d)
1	283	6	64	11	291
2	128	7	1078	12	556
3	72	8	179	13	326
4	101	9	108	14	80
5	202	10	109	15	144

Note: Over the 624 days from 2 November 2004 to 19 July 2006

1 Households have been allocated coded numbers to provide anonymity to residents.

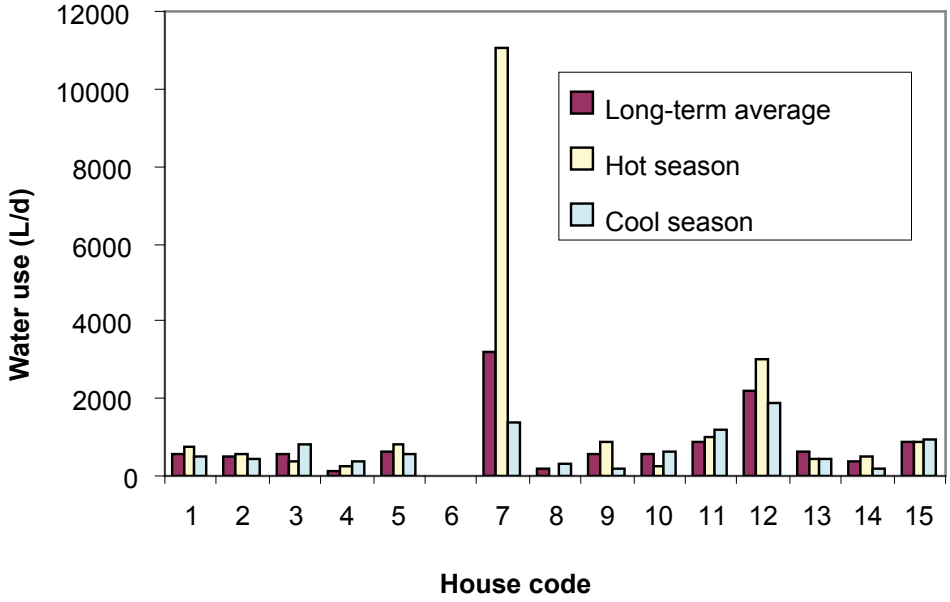

Figure 7.1: Average daily household water use over the 20.5-month period

Note: Period covered a hot season (November 2004 to February 2005) and a cold season (June to July 2006). House 8 was vacant for a large part of the monitoring period

Passive and active temperature control features in houses at Yarilena

Unlike Nepabunna, none of the houses at Yarilena use evaporative coolers for household temperature control, which is apparent in the seasonal water use patterns (Figure 7.1). Refrigerative air-conditioners are used in all the houses and are mostly reverse cycle air-conditioners. Reverse cycle air-conditioners have the advantage of providing both heating and cooling and do not use water. The cooling process occurs when the refrigerant extracts heat from the air inside the house, the heat-charged refrigerant then passes through into a condenser unit which releases the heat externally. The process is reversed when heating is required, and is effective even when the outside temperature is cool (Sustainable Energy Authority 2004).

During the peak summer period when cooling is needed at Yarilena, the electricity bill escalates accordingly. The air-conditioners can be operated on an 'economy' cycle to reduce electricity costs. Despite using refrigerant-based cooling, the weekly electricity expenditure averaged over the year at Yarilena was $10 less than that at Nepabunna ($40/week), as discussed in Chapter six. The lower electricity bills at Yarilena may be partly attributable to the use of solar panels in their hot water system (Figure 7.2). The solar panels (which were bought through a Community Grant) are an example of the sorts of sustainable housing design features that should be standard installations in all Aboriginal housing, particularly as Ceduna (and places like Nepabunna) receive an average of 8–9 hours of sunshine a day (Bureau of Meteorology 2006b). Water heating accounts for 30–35% of the energy use in most South Australian (and Australian) households (Department for Transport, Energy and Infrastructure undated; Solahart® 2007). Solahart® claims that in places like Ceduna and Adelaide (which it regards as 'temperate zones') the amount of energy used in water heating can be reduced by up to 90% by installing an efficient solar water heating system (model Solahart 302Kf Free Heat). Additional savings (from reduced electricity costs) are available through installing solar panels using a state government scheme which provides a rebate of up to $700 (depending on the size and model of the system installed), and through the receipt of Renewable Energy Certificates (RECs) that are given to the purchaser when they reduce their

electricity demand by converting to a form of renewable energy (in this case, solar). A solar panel on an average house will typically amount to around $800 worth of RECs. The RECs are usually used to 'offset' (or reduce) the cost of the solar panels, and administered by the company doing the sale of the systems (Solahart® 2007). Additional external passive cooling features in the houses at Yarilena include light coloured roofs to reflect solar radiation, extensive use of shade cloth and wide verandahs around the houses to protect the houses from direct sunlight, and trees adjacent to the house to provide wind protection and shading (Figure 7.2).

Figure 7.2: Active and passive temperature control features on houses at Yarilena

Note: Features include solar panels, reverse cycle air-conditioners, vegetation and shade cloth barriers, and light coloured roofing to reflect solar radiation.

Although Ceduna experiences hot summers, Yarilena enjoys a locational advantage, experiencing cooling sea breezes off the Great Australian Bight. For example, the sea surface temperature in summer (January to March) ranges between 18–23°C (Commonwealth of Australia 2005a),

which has a moderating effect on air temperatures in close proximity to the coast. The average daily maximum temperatures in Ceduna over summer, based on over 84 years of data (Bureau of Meteorology 2006c), are below 30°C. Specific mean maximum temperatures are 26.6°C in December, 27.5°C in January, 26.3°C in February and 26.4°C in March. During these months the average number of days exceeding 35°C are 5.4, 5.9, 3.9, 4.8 respectively, and on average, temperatures exceed 40°C only 1.7 days in December, 3.3 days in January and 1.3 days in both March and April (Bureau of Meteorology 2006c). The use of trees and shade cloth barriers at the houses (Figure 7.2) therefore serves a dual purpose of shading the house and protecting it from the strong winds and fine coastal sands.

The impact of leaks on the community

SA Water charges Yarilena according to the meter reading taken at the mains connection at the settlement boundary at the corner of Eyre Highway and Denial Bay Road. Unlike most suburban properties, where the pipeline between the mains connection at the property boundary and the house is less than 100 metres, houses on the extensive property at Yarilena are widely scattered, requiring around 5 kilometres of internal subterranean piping from the SA Water meter at the property boundary. The community is responsible for maintaining and covering the costs associated with the extensive internal infrastructure. The first occurrence that alerted the community to the possibility of leaks in their system was in 2004, when they noticed that their water costs were increasing despite little change in their water use. It was at this point that the community started reading household water meters to clarify the situation.

Comparing the mains meter reading with the sum of the household meter readings for the same period provides an indication of the magnitude of the leaks. For example, over the 20.5-month period there is a 57% discrepancy between the meter readings; that is, 57% of the water that the community is being charged for is ‘unaccounted’ for. A small portion of the ‘unaccounted’ water may have been used in the office (for which there is no water use data); however, most of the water is lost through leaks in the system. The leaks were investigated by a team from SA Water and FACSIA in February 2006. Besides some damaged valve pits, the main cause of the breaks in the system was the lack of capacity of the pipes within the settlement to accommodate the high pressure flow from the mains supply. This led to pipes bursting under the elevated pressure. High pressure within a water system allows multiple users to access a strong flow of water at the same time; if the water pressure within a system is too low, when multiple users attempt to access water simultaneously they receive a ‘trickle’ flow from their taps. To solve the problem of pipes bursting under the pressure at Yarilena, it was recommended that pressure reducing valves be installed in the system (SA Water 2006a).

The community has paid for the installation of a number of isolation and pressure-reducing valves along their extensive infrastructure and isolated a 1.5 kilometre length of piping to a lone house away from the main cluster of homes on the property. These actions have reduced the leaks to some extent. For example, the meter readings in June 2006 show a 41% water loss. While the leaks are less, the quantity of water being lost, and for which the community is paying, is still unacceptably high. At the household level, the community has been proactive in preventing leaks. To prevent leaks, a member of the community has installed corrosion resistant reseating kits (with a 100-year warranty) in all the taps in all the houses. To use plumbing services for this would have cost a few hundred dollars per house.

To address the infrastructure problems Yarilena is currently considering moving off the SA Water supply on to the Ceduna-Koonibba pipeline. This move would cut out 1.5 kilometres of problematic internal piping and a new 800 metre length of piping will be installed from the Ceduna-Koonibba pipeline on Denial Bay Road to the central cluster of houses, with a second direct link to an isolated house on the corner of the property. Pressure reducers will need to be installed on the new system to prevent the same pipe bursts that have occurred on the existing system (G McLean 2006, pers. comm.[2]). The District Council of Ceduna would then become the service provider for Yarilena. Even though Yarilena receives an adequate service from SA Water, they entered the 1996 Ceduna-Koonibba Agreement as a 'backup' arrangement, should it be required, and they have paid $1,200 each year for that privilege (i.e. they have not received any services for this payment, merely the right to access the Koonibba pipeline at any stage in their future); for that reason the sum was reduced to $800 per annum (which equates to $15 per week). A move onto the system will mean the higher access fee will resume, and the basic water charge (per kL) is marginally higher.

Appropriate water saving strategies for Yarilena

Additional water resources available to the community include additional rainwater harvesting, greywater reuse, and a coastal soak (shallow groundwater) on the property. Each of these options is discussed briefly.

The potential to use more rainwater

The maximum amount of rainwater that can be collected from each house at Yarilena was determined using the equation given in Australian Government (2004), as discussed in Chapter three. In Yarilena houses have a roof area of around 288 m^2. The long-term rainfall, measured at the Ceduna post office by the Bureau of Meteorology and based on 84.3 years of records, is 292 mm a year. Applying the formula to the data, and assuming an 85% efficiency rating, shows that each house has the potential to collect 65,606 L of rainwater each year. This amounts to 21% of the water use, assuming a use of 209 L/p/d (the long-term settlement average), although Table 7.2 shows that in some households (house 6) mains water use is as low as 64 L/p/d. The difference between the amount of rainwater that can potentially be collected from each roof, and the present storage capacity, shows that an additional 27,756 L of rainwater can be harvested from each roof. Further, evidence from one house (house 6 [see Table 7.2]), with four occupants, shows that rainwater (collected at the house and carted from the office tanks) provides almost 100% of the households water requirements, with mains water only used in the laundry and for toilet flushing.

As mentioned previously, the office block has the storage capacity for 62,459 L of water, and can harvest slightly more than this amount. The excess rainwater is carted to houses, freeing up tank space to harvest the maximum amount of rain from the roof.

The capacity to harvest more rain, together with the accumulating water debts being paid for out of the community's trust fund, prompted them, with the help of the research team, to apply for an additional rainwater tank at each house through a Commonwealth Community Water Grant. Due to the success of the grant announced in November 2006, an additional 225,960 L of rainwater can be harvested (with a concomitant reduction in the community's water costs).

2 Project review and client manager, Remote communities, SA Water, Adelaide.

As part of the Community Water Grant application, first flush diverters (shown in Figure 7.3), backflow prevention, gutter guards, mosquito proof screens and overflow devices will be installed on the rainwater tanks where they are not currently present. While this water saving amounts to only 5% of the household water costs, the rainwater tanks provide a long-term low maintenance solution; that is, the community can reap a 5% saving each year for the life of the rainwater tank. In addition, there will be the added incentive to live solely on rainwater, with further cost savings. A greater reliance on rainwater indirectly benefits the region by reducing the amount of water that would otherwise be taken from the stressed Tod-Ceduna supply.

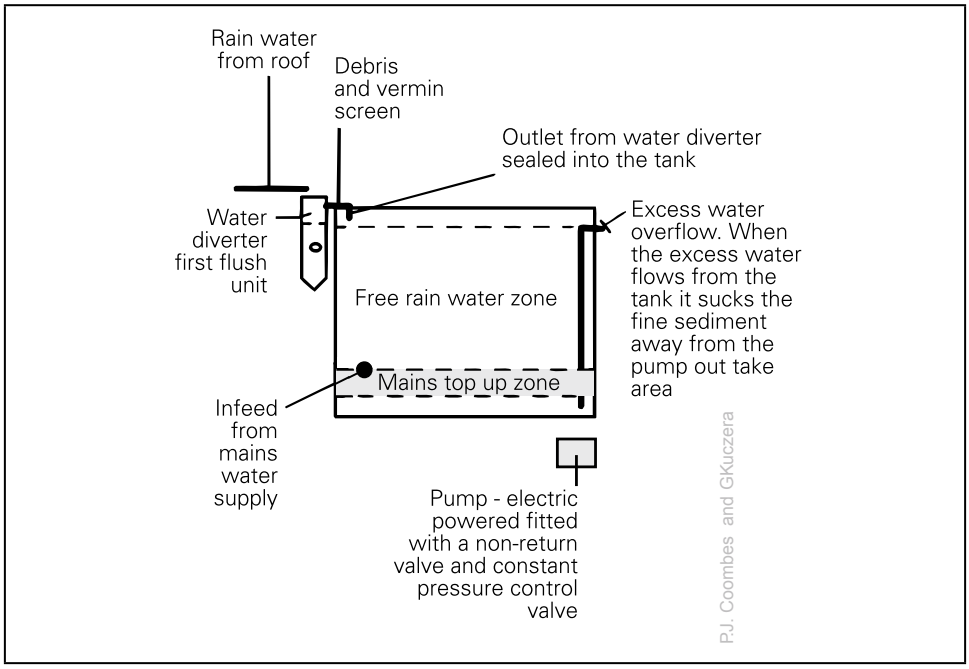

Figure 7.3: Schematic diagram of a rainwater tank

Note: Diagram shows first flush diverters, debris and vermin screen, backflow prevention and overflow devices.

Source: Commonwealth of Australia 2005b

The potential to use greywater

Yarilena has a septic tank effluent disposal (STED) system for their wastewater. Effluent undergoes primary treatment in the household septic tank, then wastewater from the septic tank discharges into a fenced off wastewater lagoon (Figure 7.4) where it is naturally exposed to solar radiation, and treated with chlorine through an automatic feed every 12 hours to kill the bacteria. The treated effluent was used to water a line of trees (Figure 7.4) extending around the main cluster of houses; however, the system is no longer operational. New piping and a larger capacity pump, preferably solar powered, are needed to reinstate the water reuse system. It is recommended that the community apply for Natural Heritage Trust funding or another Community Water Grant for this purpose.

Other water resource options

The previous federal government's Parliamentary Secretary for Water, Malcolm Turnbull was of the opinion that, given the decrease in rainfall since 2001, water options unrelated to rainfall should be considered. Furthermore, Turnbull commented that 'there are no cheap new sources of water' (ABC South Australia 2006). In the past few years there has been some discussion about the potential of a desalination plant at Ceduna. In the search for a water supply for Kimba on the Eyre Peninsula, SA Water considered a desalination plant at Ceduna; but, as with the pilot plant at Tod

reservoir, concluded that desalination was not an appropriate technology at this time due to its high energy requirements. They consider the development of this technology 'too early … to be used to address Eyre Peninsula's water crisis' (ABC News 2005a). Desalination remains a controversial topic, with others disagreeing with SA Water's stance. The state government and BHP Billiton are currently considering desalination at Whyalla and Roxby Downs.

Figure 7.4: The greywater holding lagoon and treatment plant at Yarilena

Note: The proximity of the native vegetation highlights the potential for greywater recycling.

In the early days at Yarilena (1945 and before), a coastal soak (Figure 7.5) on the property proved an adequate water supply for the 100 people and regular visitors living on the property, and remained operational into the 1970s. One of the participants in the focus group recalled how as young children they would be sent with two buckets strung across a yoke to collect water from the soak:

> *... my mother would ring a bell, like one of those cow bells, and we would have to stop whatever we were playing and come running from wherever to collect the water. Eight buckets a day – four buckets in the morning and another four in the evening – would meet the water needs for the family of eight ... At that time we used waterless pit latrines.*

As reticulated supplies and roof-harvested rainwater became available, the use of the soak dwindled. There is still water in the soak, but before it could be used again it would need to be cleaned out, a sand-resistant submersible pump installed, and piping laid a few hundred metres across the undulating dunes to the neighbouring houses. The expense of bringing the well into production is therefore not justified, particularly as it would only serve as a supplementary supply and its sustainable yield is unknown.

Figure 7.5: The disused coastal soak at Yarilena

Note: A tyre marks the position of the well to prevent vehicles driving over the well which is at the edge of a road track. A metal structure extends a few metres below the surface to keep the surface of the well open.

Concluding statement for Yarilena

Yarilena residents are an outstanding example of a community that has done everything within their power to be a water efficient community. Besides water efficiencies, Yarilena residents provide on-the-ground evidence of sustainable living using technologies appropriate to the regional conditions. Examples of the technologies employed include the use of solar panels, extensive use of rainwater, revegetation using recycled water and passive temperature control features on houses. The predominant water problem at Yarilena is the result of factors outside of their control: the incompatibility of pressure specifications of the internal subterranean water pipeline with that of the SA Water mains; a problem which has proved to be a considerable drain on their financial resources. One of the aims of this study is to identify ways of reducing costs associated with water use and thereby to promote wellbeing through a reduction in utility stress. This project will achieve this to a small extent with an anticipated 5% cost saving as a result of extending household rainwater collection through a successful Community Water Grant. Additional potential for savings will be identified in a water audit. The greatest effect will be the accumulation of water and cost savings arising from their implementation of sustainable water saving strategies.

Water supply and use at Scotdesco

With the exception of the single mens' quarters, which rely solely on rainwater, all dwellings are connected to a settlement water reticulation system that provides desalinated groundwater from a single bore within a desalination plant (Figure 7.6). There are eleven houses, two sheds converted into living quarters, the original homestead (now disused), and a caravan with extensions that are connected to the desalinated water supply. Only the eleven houses have water meters. The meters monitor use from the desalinated supply, but are not often read.

Figure 7.6: The desalination plant, which houses the bore at Scotdesco

Most of the houses have two tanks, one for rainwater collection (for cooking and drinking), and a second tank connected to the desalination plant to provide for all other water needs. Excess rainwater overflows into the desalinated water tank, where a booster pump and float valve ensure that the tank is always at least half full so that at no time will a household run out of water. According to SA Water (2006b) the water storage capacity at the dwellings varies from 21,000 L at two dwellings to a maximum of 42,000 L at six houses; however, given the roof area there is the capacity to collect an additional 416,000 L of rainwater from the dwellings alone – that is, excluding the equipment and storage sheds.

Water consumption data are limited. Based on data collected over a six-day period from 17–23 August 2006 at ten houses, water use amounted to 141 L/p/d. Extrapolating this use across the population equates to a use of around 1,904 kL each year, and possibly more as the population is quite variable (as discussed in Chapter six). Given the short duration of the data (e.g. it may not have included a weekly clothes wash in the six-day period), and that water use might be lower in August (the time of the data collection) than the hot summer months (although this is not always the case), if water use were assumed to be 200 L/p/d (an amount similar to that used by country towns across South Australia, and Yarilena), settlement water requirements would amount to 2,701 kL per annum. Water use could therefore be between 1,904 and 2,701 kL per annum, but more detailed monitoring over a longer period and across different seasons is required.

The rainfall in the region is low – Scotdesco lies between Fowlers Bay where the rainfall is 299.8 mm per annum and Ceduna where the rainfall is 292 mm per annum. In 2005, generally a dry year across north-east South Australia, 212.5 mm of rainfall was recorded at Scotdesco. Based on the equation given by the Australian Government (2004), and assuming a roof capacity of around 220 m^2, a rainfall of 299.8 mm, and an 85% collection efficiency, each house will collect around 51,575 L of rainwater each year, or 141 L/house/d. Applying the lower rainfall (212.5 mm) recorded in 2005 would yield 35,250 L each year, or 97 L/house/d. The roof area does vary between dwellings,

ranging from 40 m^2 at a converted shed to 325 m^2 (for the sole four-bedroom house). If an occupancy of two adults is applied, based on a consumption of 141 L/p/d and a rainwater collection capacity of around 141 L/house/d, the household collection of rainwater can provide at the most 50% of a household's water needs during average rainfall years, and 34% in dry years such as in 2005. Therefore, during drought periods (experienced at the time of this study) the reliance on the desalinated groundwater supply is greater. The desalinated supply is required year-round.

Problems with the desalinated water supply

Groundwater, without desalination, is not a feasible water resource at Scotdesco due to the high Total Dissolved Solids (TDS) content of 28,600 mg/L; by comparison, sea water is on average 35,000 mg/L. Untreated, the groundwater is unsuitable for stock watering, and could only be used for toilet flushing, but even that can cause corrosion of the cistern (Anderson and Cummings 1999). According to SA Water (2006b) the iron and silica content of the groundwater is also high, at 42.1 and 63.0 mg/L respectively, which causes clogging of the reverse osmosis membranes. As a result of the poor groundwater quality the membranes have a life span of around six months, as opposed to an expected three years. Every six months the community pays $12,000 for a set of four membranes. Based on the membrane replacement costs and other maintenance costs and power costs, SA Water (2006b) estimated that it costs around $25/kL desalinated water. By comparison, people in Ceduna who are on the Tod-Ceduna scheme currently pay $0.47/kL for the first 125 kL and thereafter $1.09/kL. The continuing problems and expense of operating the desalination plant is proving an emotional and financial drain on the community's wellbeing. Due to the poor quality of the groundwater, the expense of maintaining the desalination plant appears to be unsustainable for the community.

Additional water resources available to Scotdesco

The alternative water resources available to Scotdesco are limited to groundwater and rainwater. Even if new bores of a better quality than the current bore were accessed, the groundwater in the region is of a poor quality; therefore, the groundwater is still likely to need desalination if it is to be used for non-potable domestic requirements. If a better quality groundwater supply were available, it would reduce the rapid turnover of the reverse osmosis membranes, but the plant would still have high annual operating costs. In addition, the complexity of the technology means that when the desalination plant has technical problems, there is not ordinarily a cheap or quick solution as technicians have to be flown in to install new parts. The overriding problem is the poor quality (high salinity and iron content) of the groundwater. A better quality groundwater supply is unlikely to be found in the region. Given these problems, and the fact that this study is directed at finding ways of reducing settlement water costs, the discussion on additional water resources is limited to rainwater harvesting.

The potential role of additional household rainwater collection and large-scale ground-based rainwater harvesting

As discussed earlier, on average, there is scope to install an additional 27,000 L rainwater tank on each of the houses at Scotdesco. An aerial view of a core group of buildings at Scotdesco (Figure 7.7) shows the extensive roof area of buildings and the scope for more rainwater tanks—with the exception of the TAFE and office block (the hexagonal-shaped building marked by the letter E in Figure 7.7) which has four rainwater tanks.

Figure 7.7: An aerial view of a core cluster of buildings at Scotdesco

Note: This image highlights the extensive roof area of sheds (A, B, C) and a house (D) and the scope for more rainwater tanks, with the exception of the TAFE and office block (E) which already has four large rainwater tanks.

In response to a request from AARD in June 2006, SA Water conducted an appraisal of the water supply options for Scotdesco; one of the recommendations is that rainwater be harvested from a two-hectare ground-based catchment (SA Water 2006b). In terms of saving Scotdesco money, engineered ground-based rainwater harvesting (RWH) catchments have very high capital costs and therefore such an option would have to be externally financed. However, in general the maintenance costs are low and simple, and the lifespan of a ground covering such as high density polyethylene (HDPE) plastic lining, even in harsh semi-arid conditions is around 15 years.

Comparing the replacement and long-term maintenance costs of desalination plants with large scale RWH shows that the latter is a more cost effective and sustainable solution. RWH is a low technology solution that the settlement can maintain, and is therefore more suited to its remote location where technical consultants from water supply agencies are not on hand.

The advantages and disadvantages of RWH for another Aboriginal settlement—Koonibba, located in a low rainfall region 55 kilometres to the east of Scotdesco, are detailed in Pearce et al. (2005a) and Pearce at al. (2005b) respectively. Ground-based RWH (Figure 7.8) supplemented the Koonibba water supply that came from the SA Water administered Kalambi main, which also served a number of private landholders in the region. The Kalambi water supply was discontinued

in the late 1990s with the advent of the Water West system (the Ceduna-Koonibba pipeline). In addition to the ground-based RWH, rainwater was collected from a conglomeration of settlement buildings and stored in steel ground storage tanks. When there was plentiful rainfall it was pumped to a small overhead tank and reticulated throughout the settlement. When this rainwater system was being used, the Kalambi water was isolated from use if the northern storage tanks were full, or kept online until the tanks were full and then isolated. The large-scale roof-based collection system was extensively upgraded in 1992/1993 but has more recently fallen into a state of disrepair and is no longer used (J Kavanagh 2007, pers. comm.[3]).

Figure 7.8: The former ground-based rainwater harvesting catchment at Koonibba

Note: The rainwater harvesting catchment area is in the background, with the storage tank in the foreground. Koonibba Aboriginal settlement is on the west coast of South Australia.

The benefits of RWH for domestic and agricultural supply in semi-arid regions is well documented internationally (Rees et al. 2000; Thomas 2000; Hartung 2002; Martinson and Thomas 2003). Furthermore, RWH is known to provide a vital water supply during periods of drought (Mou 1995; Mourits and Kumar 1995), where public supplies are unreliable (Hartung 1999), or as an emergency supply (Perez 2002). While widely accepted internationally, RWH is also receiving renewed interest in Australia. In the early 1900s rainwater runoff was collected from localised, impermeable granite outcrops in Eyre Peninsula for domestic and small-scale stock watering. Low concrete walls channelled the runoff from the foothills of the outcrops to built-up or underground storage structures, some of which were covered with corrugated iron roofing (similar to that shown in Figure 7.8) to prevent contamination and losses through evaporation. Many of the rainwater catchment systems continued to provide a supplementary, and freshwater supply into the early 1970s (Twidale and Smith 1971; Twidale et al. 1985). Similarly, there is evidence of wide use of engineered catchment RWH on farms in Western Australia since the 1950s (Laing 1981; Richardson et al. 2004), but more recent use, if it occurs, is not well documented. It may be, as in the case of Eyre Peninsula, that when reticulated mains water supplies became available, the rainwater harvesting schemes were abandoned. Concern over the ongoing decline in rainfall across parts of South Australia, and fears about the paucity of regional water resources, has however,

3 Formerly of DOSAA, now a consultant for SA Water, FaHCSIA and other organisations.

renewed interest in large scale RWH. Ground-based RWH is now being undertaken or considered on properties on Boston Island near Port Lincoln, Wistow in the Adelaide Hills, Kimba (SA Water 2006b), and the region west of Ceduna (G McLean 2006, pers. comm.[4]).

Following a meeting with the Koonibba Aboriginal community in 2003, where they expressed a desire to reinstate their former RWH scheme due to concerns held about the paucity of the regional water resources, Pearce et al. (2005a) examined the feasibility of RWH there. The amount of water harvested varies depending of the material used to cover the ground surface, for example, high density, durable plastic (HDPE) has a runoff efficiency between 57–76%, whereas asphalt surfaces have a runoff efficiency of 81% (Li et al. 2004). Pearce et al. (2005a) found that depending on the type of material used Koonibba can collect between 5,472 and 5,832 kL of rainwater annually, from a 24,000 m^2 (2.4 hectare) area.

Applying the maximum runoff efficiency rating for high density plastic (76%; Li et al. 2004), the rainfall at Scotdesco (299.8 mm), and the 2 hectare area (20,000 m^2) suggested by SA Water (2006b) results in a collection of 4,557 kL of water at Scotdesco annually. Based on a water use of between 1,904 and 2,701 kL/annum, this would satisfy the water requirements of the settlement during normal rainfall years. The larger-than-necessary catchment size (of 20,000 m^2) would allow for some contingency during slightly drier years. In average rainfall years, excess harvested rainwater could allow the community to develop bush tucker plantings, one of their expressed desires. The expansion of the settlement is currently limited by their water supply. The water savings would, therefore, also have the potential to sustain a slight growth in the population of Scotdesco.

While much has been written in favour of RWH, not all studies tout the success of RWH projects (Perez 2002; Sharma 2002). There are factors that can make RWH unattractive to settlements (Pearce et al. 2005b); for example, rainwater harvested from ground-based catchments is not suitable for direct potable use, and may require some form of disinfection prior to use for showering.

The potential role of composting toilets

Some members of the community expressed a desire for waterless toilets outside the houses. There are two reasons for this: firstly, to save water; and secondly, when there are power failures (which occur frequently) occupants cannot flush the toilet once the cistern has emptied. According to WaterCare (undated), a ‘typical’, older-style three-bedroom household with three occupants uses around 41,800 L each year for toilet flushing, or 13,933 L/p/year. Assuming an occupancy of two people, this equates to 27,866 L of water used in each house every year. Based on the current costs of desalinating the water supply ($25/kL), this means that each year a house uses $697 worth of water on flushing toilets. Applying this calculation to the population of Scotdesco (37 people x 13,933 L/p/year x $25/kL = $12,888) reveals that each year around $12,888 is spent on flushing toilets. Installing dry toilets at each dwelling would offer a low maintenance, sustainable, long-term means to reduce water use. The saving of $12,888 would not be limited to just one year, but would be saved every year for the life of the toilet; over many years this would accumulate to a sizeable saving to the community. It is recommended that the community investigate the cost of installing composting toilets at each household and apply for a Commonwealth Community Water Grant to fund the endeavour. It is a sustainable, water saving strategy that highlights the proactive behaviour necessary for sustainable living in desert regions.

4 SA Water

Modern technology has significantly improved the appearance, design (Figure 7.9) and operation of composting toilets to provide odour-free, hygienic, low maintenance toilets that do not use any water. Composting toilets appear in upmarket eco-lodges; for example, Jemby Rinjah in the Blue Mountains, New South Wales, which charges around $250 per night, has composting toilets in their eco-lodges. While the toilets may appear the same at the surface, the capacity of the below-the-floor processor comes in a range of sizes to suit the size of the household. According to Clivus Multrum®, the composting toilet works in the same way as a garden compost bin. In the toilet system the waste breaks down through a natural process of organic decomposition. No chemicals are added, and the decomposition process is facilitated by adding small amounts of organic material (such as garden clippings or wood shavings) to the compost processor (Figure 7.9). The air vents (Figure 7.9) ensure that the waste in the compost processor is adequately aerated to ensure odourless decomposition. The toilet is low maintenance. The toilet bowl requires the same level of cleaning as a regular toilet bowl (only using a biodegradable cleaning agent). The Clivus Miltrum® design keeps the old and new compost separate, so that the fully composted material can be easily accessed. The end product (finished compost) is safe to handle after being in the processor for a year or more. It looks and smells like ordinary garden compost and can be used in the garden.

At Scotdesco all dwellings are on septic tank systems that drain locally (as opposed to a STED scheme), so there is no scope for recycling of water. Apart from new water resources, 'additional' water can only come from further efficiencies and water use savings in and around the home.

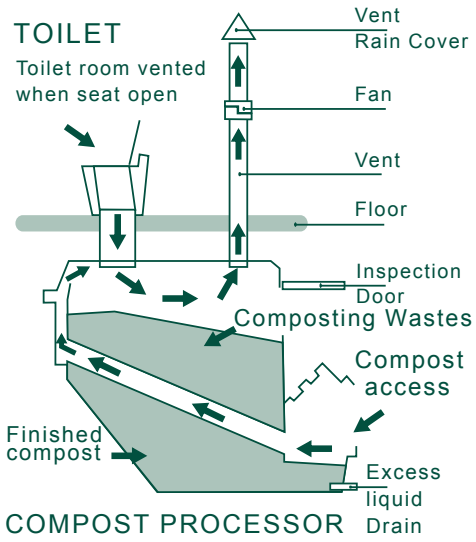

Figure 7.9: The Clivus Multrum® composting toilet

Note: This schematic diagram shows the above and below-the-floor functional components of a composting toilet

Concluding statement for Scotdesco

There are limited water resource options available to Scotdesco due to its location and poor regional groundwater quality. Of the options available, large-scale ground-based RWH and the use of composting toilets appear to be sustainable solutions. While these options are appropriate to the locational constraints, they are not cheap. The community does not have the means to acquire the technology, so it is recommended that the community apply for a Commonwealth Community Water Grant and other outside agency funding to install these technologies. The importance of community engagement in decision-making when RWH is being considered as a water supply

option has been highlighted in a study by Perez (2002) in Mexico. The findings of Perez (2002) are perhaps pertinent to Scotdesco, as the community feels that the RWH option 'is being forced upon us'. It is therefore recommended that the community familiarise themselves with the RWH process and its advantages and disadvantages; enquire further about the long-term maintenance costs and life of the engineered RWH catchment; visit areas and speak to the landholders where RWH is operational; and hold community discussions on the topic, so that the community make a fully engaged and informed decision on whether to proceed with RWH. If the RWH technology is installed, as a self-funding settlement, the monies collected through household water payments would need to be used for day-to-day maintenance and long-term replacement costs of the water supply system.

Chapter eight: Cost of living at Davenport

Introduction

Davenport settlement offers a unique opportunity to examine the cost of living for an Aboriginal settlement within a larger rural township. Two factors are significant here: firstly, some supermarket chains in Australia maintain the same price structure across the state, bringing food costs into line with city prices; and secondly, ABS research indicates that Aboriginal people living in town-based settlements are poorer than those Aboriginal people living elsewhere in the town (ABS 2002). Sanders (2004) notes that the incomes of these populations are closer to the incomes of people living in remote settlements than to those of Aboriginal people living elsewhere in the town. This is certainly the case for Davenport residents in Port Augusta. Taylor and Bell (2003) note that the populations of such settlements vary, with the 15–25 year old cohort of males spending a lot of time moving between the settlement and the town.

Construction of a hypothetical family

The generation of a reliable hypothetical family for Davenport requires access to data on population, income, employment, family and household size. The data sources used in this study are the 2001 Australian Census published by the ABS, data from the National Aboriginal Health Strategy R3 Project Impact Assessment 2005 and data gathered during this study as part of the water audit and focus group discussions. The period of data collection was May 2006 to April 2007. The hypothetical family for Davenport is estimated to be two adults and one child under the age of 13. This is an average calculation and does not draw attention to periods of high tenancy that occur in some houses and the presence of young adults aged 15–19 in numerous families.

Davenport population

In terms of the ABS Australian Indigenous Geographical Classification, Davenport is one of three Indigenous Locations (ILOCs) that make up the Indigenous Area (IARE) known as Port Augusta, namely Port Augusta Institution, Davenport and the remainder of Port Augusta. According to the 2001 ABS Census, the population of Davenport was 220, with 99% (217) of these identifying as Aboriginal people and the remaining 1% (3) being non-Aboriginal. At this time the settlement comprised slightly more males than females (114 males, 106 females).

Table 8.1: Population of Davenport

Aboriginal			Non-Aboriginal			Total		
Male	Female	**Total**	Male	Female	**Total**	Male	Female	**Total**
111	106	**217**	3	0	**3**	114	106	**220**

Source: ABS 2002

More recent data for Davenport suggest that there has been a decline in the resident population. The 2005 NAHS assessment indicates a population of 154, but details of gender composition are not provided. Data collected by the Davenport settlement in September 2006 reveal a population of 176 (174 Aboriginal people, two non-Aboriginal people) with females outnumbering males (107 females, 69 males). Our research shows 158 people residing at Davenport in February 2007 (97 adults, 42 children under 15 and 19 young adults aged 15–19).

There are broad differences in population estimates for Aboriginal settlements. For settlements like Davenport, population estimations are confounded by its close proximity to Port Augusta. Taylor and Bell (2003) have noted that estimating population numbers for these settlements is more difficult than for remote or urban settlements. They suggest that the composition of the population may be reasonably accurate, but the numbers may be skewed. The reason for this is that a significant diaspora of the Aboriginal populations in settlements like Davenport move between settlement and town making estimates of population numbers difficult.

Age composition

Figure 8.1 shows the age composition of the Aboriginal population of Davenport. The population is distributed across all the age groups with the exception of the 55–59 year age group where no females are represented. The median age for Aboriginal people in Davenport is 24 years. This figure is significantly lower than the median age for the non-Aboriginal population in the larger Port Augusta council area (38 years).

The data recording the age breakdown of the Davenport settlement were not up to date and were unclear. Ninety-seven adults (aged over 19) reside in Davenport with 42 children under the age of 15, and 19 residents aged 15–19. The children are distributed among 15 households ranging from one in some households, up to eight in one other household. The average is two to three children per household with children, or one child per family. However, the distribution of tenancies is uneven.

Household size

The ABS Census 2001 indicates that the mean household size for the Aboriginal population of Davenport was 5, which is twice that of non-Aboriginal households in Port Augusta. Although it does not provide information about the number of people living in each household, NAHS data 2005 (Parsons Brinckerhoff 2005) indicate that Davenport comprises 39 houses, with only 32 of these being habitable at that time. This gives a population density measure (PDM) of 4.8 (154/32). It was proposed that seven new houses be built to ease the pressure on existing housing stocks and reduce the PDM to 4 (154/39).

Community collected data (Appendix 16) suggests that there are 43 households (of which five are vacant) and an average of 3.5 people per household (2.2 adults, 0.9 under fifteen and 0.4 young people aged 15–19). Tenancy is unequally distributed in some three- and four-bedroom homes. There are a total of 116 bedrooms in Davenport for 158 residents. There is a single occurrence of 15 residents in one three-bedroom house, and seven in a two-bedroom house. Those with three bedroom houses have an average tenancy of six to seven residents. This compares with ABS (2002) data which record five people per household in Davenport, and a mean of 3.4 per household in Port Augusta more generally.

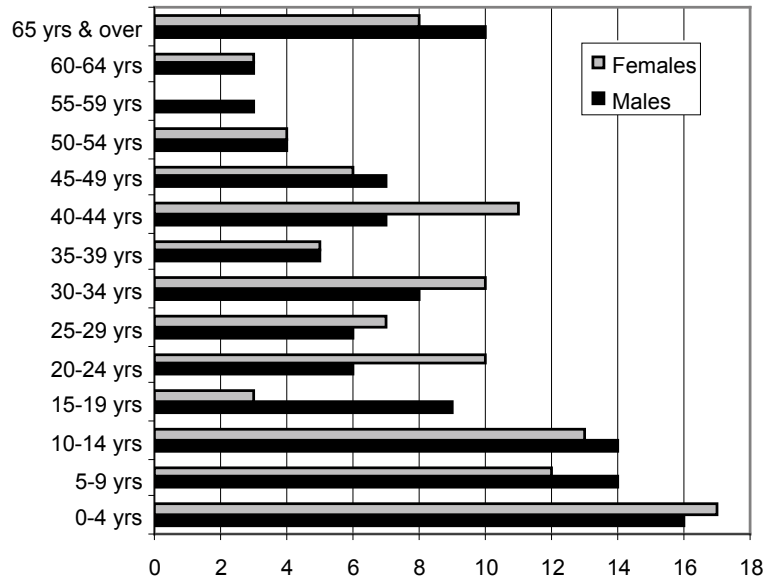

Figure 8.1: Age composition of the Aboriginal population of Davenport

Source: ABS 2002

Calculation of the income of a hypothetical family

Employment opportunities at Davenport

The 2001 Census data on employment shown in Table 8.2 indicates that 119 Aboriginal people were aged 15 years and over at that time. Out of this potential workforce, 6.7% (8) were employed in CDEP, another 6.7% (8) were employed in other areas and 2.5% (3) were unemployed. The remaining 84% (100) of Davenport's working age population fell into the ABS category 'not in the labour force'.[1]

The 2005 NAHS data for Davenport adds to this picture, reporting that nine people are participants in the Bungala regional CDEP. Participants are involved in land management projects, undertaking landscaping, oval maintenance and assisting the Essential Services Officer and office workers.

The data collected by a community member in February 2007 shown in Table 8.3 indicates how the employment situation in Davenport has changed. At that time the settlement comprised 116 people aged 15 and over, 97 being adults and a further 19 being young people aged 15–19 years. However, the data suggests that only one person in the 15–19 year age bracket was part of the labour force. Most people in paid employment were employed by CDEP (24) and 13 others were employed in other areas. Forty-seven Davenport residents received unemployment benefits and 14 were recipients of a disability support pension. The population of Davenport was therefore largely unemployed or in CDEP employment.

1 ABS definition of not in the labour force: those in the population who do not satisfy either employment or unemployment criteria. It includes persons who do not want to work for a variety of reasons such as homemakers, retirees and those who are unable to work due to disability. In addition, it includes people in hospital, prison or other institutions (ABS 2001, p. 232).

Table 8.2: ABS (2002) employment data for Davenport (15 years and over)

	Aboriginal			Non- Aboriginal			Total		
Employment	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Employed CDEP	5	3	8	0	0	0	5	3	8
Employed other	3	5	8	3	0	3	6	5	11
Unemployed	3	0	3	0	0	0	3	0	3
Total labour force	11	8	19	3	0	3	14	8	22
Not in labour force	46	54	100	3	0	3	49	54	103
Unemployment rate %	27.3	0.0	15.8	0.0	0.0	0.0	21.4	0.0	13.6

Source: ABS 2002

Table 8.3: Employment data for Davenport (15 years and over), data collected in February 2007

Employment	**Total**
Employed CDEP	24
Employed other	13
Unemployed	47
Total labour force	84
Not in the labour force: recipients of disability support pension	14

Source: Community generated data

Income at Davenport

Relying on ABS Census data and supported by our own research, key sources of income in Davenport include wages for labour in CDEP or in mainstream forms of work, along with Centrelink benefit payments. Table 8.4 provides a comparison of the median weekly income at the level of the individual and family for Davenport and the other Indigenous Locations within the same Indigenous Area. Based on the ABS 2001 Census, the data shown relate specifically to gross income derived from sources such as wages, salary, pensions, unemployment benefits, family allowances, student allowances and maintenance.

The individual income of a Davenport resident is significantly lower than that of a Port Augusta resident (ranging from $80–119 for a Davenport resident to $200–$299 for an Aboriginal Port Augusta resident and $300–399 for a non-Aboriginal Port Augusta resident). Families are similarly disadvantaged in terms of income. Davenport families receive around $300–399 per week while Aboriginal families receive up to $599 in Port Augusta. In Davenport, the rent paid by Aboriginal people falls at the lower end of the scale ($1–49), reflecting the lower incomes of residents of the settlement.

Table 8.4: Median weekly income for Indigenous Locations in the Port Augusta Indigenous area

Aboriginal Location	**Median weekly individual income $**		**Median weekly family income $**		**Median weekly rent $**	
	Aboriginal	**Non-Aboriginal**	**Aboriginal**	**Non-Aboriginal**	**Aboriginal**	**Non-Aboriginal**
Davenport	80–119	120–159	300–399	n.a.	1–49	n.a.
Port Augusta Institution	n.a.	500–599	n.a.	300–399	n.a.	500 & over
Port Augusta: remainder	200–299	300–399	500–599	700–799	50-99	50–99

Source: ABS 2002

The hypothetical family income

Given the population, household size, age range of the children, and the employment characteristics of the labour force at Davenport, the composition of the hypothetical family is two adults, both deriving income from Newstart Allowance, and one child aged under 13. The total income this family earns each week is $640.12. Table 8.5 provides detail of this income.

Table 8.5: Income of the hypothetical family at Davenport (two adults and one child aged under 13 years)

Newstart Allowance	$189.90 x 2	$379.80
Family tax benefit part A 1 child aged under 13 years	$70.42	
Family tax benefit part B	$26.60	
Total weekly income	**$476.82**	

Establishing the cost of living at Davenport

Travel, utility and rental costs

Members of the Davenport community pay for their electricity and water through the Davenport settlement Municipal Services Office. Housing and accommodation rental is also paid monthly through the Municipal Services Office.[2] Accommodation is built in a public housing format. Residents pay a weekly amount of $75 ($60 for flats) for housing and contribute to a general water fund for the settlement of $15 per week (Table 8.6). AGL records electricity use at the resident's meter quarterly, and while it is difficult to suggest an average, quarterly costs are between $400–$500.[3] On an occasion when an electricity bill is, for some reason, inordinate (a bill of $1,500 due to excessive air-conditioner use has been seen), the MSO has stepped in to pay for the family. Both mobile and land-line telephones are in use in Davenport. It is common for the land-line telephones to have bars on them (either STD or both STD and local) due to previous problems in accruing large bills (up to $500/quarter) and having difficulties in paying them. Mobile phones tend to be run through pre-paid accounts at around $50 month.

Davenport residents shop at the Port Augusta shopping precincts. The shopping services are about five kilometres from the Davenport settlement, and people generally find their way there through the use of their personal vehicles. Most residents have vehicles, which are either owned or being paid off. Fuel costs differ across families but seem to range from $30 as a basic cost, to $100 in the higher range.

Population movement is significant in Davenport; therefore, many houses have variable levels of residency. As a guide, the settlement experiences about a 20% fluctuation through the week, and about a 40% fluctuation seasonally; for example, in summer[4] the population can increase by 50%. This has a significant effect on utility use and other associated household costs.

Houses are equipped with air-conditioners and residents are responsible for furnishing their houses. This includes furniture, kitchen and laundry appliances and general household items like crockery, cutlery, and bedding.

2 In December 2006 amendments to the Municipal Services Act (MSA) required the Davenport settlement (and numerous other Aboriginal and Torres Strait Islander settlements across the country) to hand over assets and close their Municipal Services Office. Further comment on this matter follows in Chapter ten.

3 It is important to note that a number of residents mentioned that their meters did not seem to be read by officers of the electricity corporation, which suggests their readings may be estimated from previous bills. However, the charges are eventually adjusted.

4 In 2006 a transit accommodation service was developed in Davenport for the significant number of Aboriginal people moving through Port Augusta for various reasons.

Schooling costs

Families on low incomes are eligible for a School Card which for primary school children amounts to a payment of $175 per year per child and for high school students $225. For Davenport residents school fees are cancelled out by the equivalent School Card payment.

Table 8.6: Selected travel and utility costs for the hypothetical family at Davenport

Item	Cost per week $	Annual cost $
Fuel costs for cars	30.00	1,560.00
Tyres and repairs	20.00	1,040.00
Car registration	11.23	583.96
Car repayments	41.38	2,151.76
Electricity	40.00	2,080.00
Phone (most have STD bar)	20.00	1,040.00
Rent	75.00	3,900.00
Water	15.00	780.00
Total	**252.61**	**13,135.72**

Medical and associated health costs

Weekly and yearly medical costs are given in Table 8.7. The hypothetical family is eligible for a Health Care Card. Pika Wiya Aboriginal Community Controlled Health Service provides free pharmaceuticals at the community health clinic for those on a Health Care Card and for pensioners. Health Care Card holders are also eligible for free emergency ambulance travel and some transport concessions. Aboriginal people at Davenport on wages can also use the Pika Wiya Health Service but pay the regular price for pharmaceuticals. As noted elsewhere in this report, dental care is available at Pika Wiya, but the waiting time is significant.

Creation of a family menu and the costing of items at a local store

Compiling a store box

Generating a stores box involved three processes:

(1) Compiling a weekly family menu for the hypothetical family (Appendix 17). This was done by three women at Davenport during the November 2006 visit to the settlement.

(2) Pricing the items in a Woolworths store at Port Augusta.

The weekly menu that was used to create the consumable food list was based on reports from two families at Davenport. Unlike the Tregenza and Tregenza (1998) study, no attempt was made to determine the nutritional value of the diet. Access to fresh fruit, vegetables and a wide range of nutritional foods was generally good. The amount of food in the shopping list is guided by the quantities used in the *Australian Guide to Healthy Eating* (AGHE) for each food group (Smith et al. 1998) and modified according to what people in the settlements said they ate.

Table 8.7: Weekly and annual medical and associated costs for the hypothetical family at Davenport

Item	Cost per week $	Annual cost $
PBS prescriptions up to threshold for one family	Nil	Nil
Glasses: one pair per adult every four years	2.50	130.00
Total	**2.50**	**130.00**

Survey of the cost of food from the weekly menu

A survey of supermarket items from the shopping list was conducted in November 2006 at a Woolworths store in Port Augusta. Woolworths has a policy of charging a standard price for most food items across the state, so no comparison with Adelaide was done. Items were divided into groups that were bought weekly, fortnightly or monthly. The total cost of these items has been divided by two for fortnightly, or four for monthly items and added to the weekly cost of shopping to gain an average weekly cost. Food costs were estimated to be approximately $137.47 per week, and an additional $15 per week was added for school lunches and snacks, bringing the total weekly expenditure on food to $152.47 (Table 8.8).

Table 8.8: Estimated weekly and annual costs for food, health consumables and health hardware

Item	Cost per week $	Annual cost $
Food (weekly shop and school lunches)	152.47	7,928.44
Health consumables	62.19	3,233.88
Clothing	15.00	780.00
Health hardware	11.83	615.16
Total	**241.49**	**12,557.48**

Note: At Davenport, in November 2006

Health hardware costs

Clothes were mainly bought in Port Augusta, although people did make trips to Adelaide during the year and clothes were sometimes bought during these trips. Clothes purchased were often second hand. Clothing expenses were estimated at $15 per week ($60 per month; Table 8.8).

Health hardware consists of less common expenditure such as brooms, mops, buckets, cooking utensils, blankets and other bedding and white goods such as kettles, toasters, refrigerators and washing machines. These are often purchased at Port Augusta. Families are responsible for the purchase of their own white goods.

An estimation of the weekly expenditure of the hypothetical family

Table 8.9 provides a list of average weekly and annual expenses for the hypothetical family at Davenport in 2006. The hypothetical family income at Davenport is estimated to be $476.82 per week ($24,794.64 per year) with $496.60 per week and $25,823.20 annually needed for basic essential items. This indicates that there is a shortfall of $19.78 in the family's income to cover basic costs. It is important to note that these calculations do not include travel to funerals, holidays, Christmas and birthday gifts, family celebrations such as weddings or family related emergencies. Nor does this calculation allow for occasional treats or the adequate intake of fruit and vegetables, particularly important for a population with higher than average incidence of diabetes. Other costs not included in the budget are purchase of Austar satellite pay television, sporting activities, including travel to sporting fixtures, cigarettes or alcohol, household furnishings, or personal care such as hairdressing.

Table 8.9: Average weekly and annual expenses for the hypothetical family at Davenport, in 2006

Item	Cost per week $	Annual cost $
Travel, utility and rental costs	252.61	13,135.72
Medical costs	2.50	130.00
Food, health consumables, health hardware and clothing	241.49	12,557.48
Total	**496.60**	**25,823.20**

Limitations of the study findings and the impact of user pays water services on the wellbeing of Davenport residents

This analysis uses a hypothetical family at Davenport of two adults and one child, with both adults unemployed. While this may be an under-estimation of the income for some families, it is an over-estimation for those families at Davenport whose income is limited to either a disability or aged pension and who have responsibility for more than one child. Our visits indicate that some aged pensioners are in this situation, where children are moving between households and regularly require their grandparents to feed them. The analysis has also confined income estimations to the family unit, rather than to households. While households may generate more than the $476.82 per week, as noted in previous chapters, our research indicates that it is erroneous to assume that household costs are shared equally in Aboriginal settlements. The Commonwealth recognised this when Centrelink payments were altered so that fortnightly allowances were paid to both the man and the woman in the family unit. An additional factor in Davenport is the gross variations in household size within the settlement and across the year. The gross average is 4.2 residents per household, with 97 adults and 61 children/teenagers. There are ten households with more than four or more adults, six of these households without children. These variations make determining a hypothetical family problematic. If the number of households with children is averaged then a typical family is close to two adults and three children which is the measure used by the community in other instances to describe themselves. However, if the median is used the hypothetical family is closer to two adults and one child. These differences in perception caused some discussion in the final focus group and resulted in the numbers being re-checked by the community and an explanation of the methodology provided for the apparent discrepancy.

The data illustrate that the entire household income for the hypothetical family is spent on food and transport and other essential household health hardware and consumables. The methodological difficulty outlined in chapter three may be one explanation for expenditure being greater than income. We noted in Chapter three that the women who compiled the weekly menu may not be representative of the hypothetical family. Families on incomes close to the hypothetical family may eat less food with less variety, particularly around more expensive items such as quality cuts of meat. One possibility is that vocal members may well be those who are on higher incomes. Another is that people go without. While we did find evidence in other settlements of people going without food and sending children to school without breakfast or money for lunches, our engagement at Davenport did not allow this level of information to emerge.

Amendments to the Municipal Services Act

During the course of this research the federal government amended funding arrangements for municipal services to those Aboriginal settlements close to large rural towns, effectively constituting them as suburbs. In the case of Davenport, the proposal is for it to become the responsibility of Port Augusta Council, rather than an Aboriginal settlement. Similar developments are occurring in the Northern Territory, in Alice Springs with the Tangentyere town camps, in Katherine, Darwin and in other South Australian Aboriginal settlements. The impact of this policy will be far reaching in terms of utility supplies and water conservation as well as land and home ownership. For example, water is currently measured in terms of the whole settlement (at the Davenport inlet by SA Water). The bill is administered to the Davenport Municipal Services Officer (MSO). Without an MSO, individual water meters will need to be read and individual bills delivered. Mail is also managed through the MSO, so mail delivery (i.e. delivery of individual

bills) will also be affected. The concept of a whole of community approach to water sustainability will no longer hold, or be possible, given the lack of community-based resources. In the past Davenport community has pushed for individual billing, but this was always in the context of them controlling their own internal affairs and remaining a designated Aboriginal settlement. While these new developments may lead to individual household billing, the capacity of the community leaders to assist poorer families will be diminished by the loss of funding for community staff.

Conclusion

It is useful to consider the unique characteristics of Davenport. Davenport was originally the home of the Nukunu people who were the original occupants of the Port Augusta region. In 1993, in a study done by Moisseeff et al. (1999, p. 34), residents were asked to identify their birthplace. One hundred and thirteen different towns or regions throughout Australia and 11 main language groups were identified. The main language groups were Pitjantjatjara (24%), followed by Adnyamathanha (13%), Antakarinja (11%), Arabana (11%), Arrernte (9%), and Dieri (7%). This variety of cultural backgrounds has proved to be one of the difficulties for community leaders trying to forge a strong unified approach to issues. Unlike the other three settlements in this study, Davenport is not a settlement based on a small number of extended families but on a group of people from varying cultures and languages living together. However, attendance at the final focus group indicates a high level of community engagement in its affairs. At the final focus group session where the report was signed off, twenty adults attended, some of whom were in CDEP employment. Davenport community arranges all its formal meetings on a Thursday so that as many community members as possible can attend.

As a final comment, Davenport stands out among the four settlements in this study for its high rate of unemployment. While it could be argued that Davenport residents have more opportunity to access mainstream employment than residents of the other three settlements, the reality appears to be otherwise. The negative impact of long-term unemployment on the family and household resource base is well known (Carson and Martin 2001). Anecdotal comments from Davenport residents engaged in collecting data for this research project indicate that a significant level of gambling occurs in the community. It is taken up by poorer members as a last ditch attempt to supplement their income. The difficulties for single men living alone were also noted. The findings from Scotdesco confirm that difficulties are experienced by young men or women when they live alone. Given this, the impact of future price hikes linked to the NWI on Davenport residents should be carefully monitored. There may be opportunity for some families to install a range of water saving household technologies, but any improvements at a settlement level would need to be funded by government or private agencies.

Chapter nine: Water use at Davenport

Introduction

The research objective to reduce water use through identifying sustainable water saving technologies, and to promote Aboriginal wellbeing through reducing 'utility stress' is most pertinent to Davenport. Davenport has had a subsidy (which they received from the former Department for Aboriginal Affairs and Reconciliation) progressively scaled down over a period of three years. Davenport is now in the middle of the complex process of being 'mainstreamed' as a suburb of Port Augusta. 'Complexities' relating to this 'mainstreaming' process, as voiced by the Port Augusta City Council (Stephens 2007), include uncertainty about the level and cost of services required in Davenport, Council rates to be chargd on the internal properties, the status of infrastructure, accessibility to the property and the expertise and resources required for this process to succeed.

Water supply

Davenport, as with Port Augusta, receives Murray River water via the Morgan–Whyalla pipeline. The quality of the water in Davenport is similar to other South Australian country areas on the system. *The State of the Environment Report* for South Australia (Government of South Australia 2003) presents the five-year average concentrations and the compliance of a number of water quality parameters recorded in customers taps in the Eyre Peninsula region from 1997/98 to 2001/02. Microbiological content, nitrate, copper, iron, fluoride and manganese concentrations showed good compliance with Australian Drinking Water Guidelines (ADWG), but Total Dissolved Solids (TDS) exceeded the recommended concentrations 88% of the time, with the five-year average TDS at 982 mg/L. Under the Australian Drinking Water Guidelines, and based on taste, the TDS of drinking water 'should not exceed 500 mg/L' (NHMRC 2004). According to the ADWG the palatability of Davenport's water is close to being classified as 'unacceptable' – water with a TDS between 800 and 1,000 mg/L is classified as 'poor', and above 1,000 mg/L TDS as 'unacceptable'. TDS values range between 45 and 750 mg/L in major Australian reticulated supplies (NHMRC 2004).

SA Water supplies water to a single meter at the boundary of Davenport settlement from where the water is reticulated throughout the settlement. The community is responsible for all internal water infrastructure and billing arrangements. As Davenport is classified as a single Aboriginal Lands Trust (ALT) property, legally SA Water does not have the jurisdiction to read individual household meters. Davenport's status as a single ALT property is part of the reason for some of the concerns raised by the Port Augusta Council outlined previously. Those concerns are an example of the complexity of the issues that will arise as a result of Davenport's potential change in status. As a recipient of SA Water under the statewide pricing policy (see Box 9.1), Davenport Council receives one bill which is 'sent direct to the Corporation Secretary', as outlined in Box 9.1.

Residential water rating system

There is a statewide price for water. This means that whether you live in Ceduna or Campbelltown, Goolwa or Glenelg, everyone pays the same price per kilolitre for water regardless of the cost of getting that water to your home. This system is considered the fairest way to spread the cost of providing and maintaining basic water facilities across the community. Water pricing for residential customers is broken down into:

- An annual charge for supplying the service
- A stepped pricing system for water use – the more you use, the higher your bill

Residential properties include houses, maisonettes, home units, flats and strata/community title residences and vacant residential land.

The residential water charges set by Government for 2006/2007 are:

- A quarterly access charge of $37.00
- 47 cents per kilolitre (kL) for the first 125 kL used in the year
- $1.09 per kL for residential consumption above 125 kL over the year

These rates are payable on any land that can be connected to an available water main, whether or not the property is connected to the water supply system.

Strata and community title properties

If your home is part of a strata or community title corporation and the water supply is provided through one meter, there are three available options for water use billing.

Your strata or community title Corporation Secretary can apply to SA Water, for one of the following billing options to be implemented:

- An even split between all the units included on each individual owners' accounts
- An uneven split (agreed by the owners) included on individual owners' accounts
- An account sent direct to the Corporation Secretary*

Box 9.1: An excerpt from the SA Water website outlining their water pricing and billing system

Source: SA Water 2007

* Note: This applies to Davenport.

Water use

Water readings were taken at each building in Davenport every Monday and Friday over a six-week winter period from 19 June to 28 July 2006; once in September; and every Monday and Friday over a four-week summer period from 27 November to 15 December 2006. As shown in Figure 9.1[1], household water use is variable.

There are 43 occupied houses in Davenport, each with an individual water meter. In addition Wami Kata (aged care facility) currently houses 24 people, but has a capacity for 28, and the visitors campsite – Lake View – can accommodate 60 people. The data collection revealed that there are problems with a number of the meters that renders them unreadable: some of the meters operate in the reverse (i.e. the meters count down – see Figure 9.1); some meters on houses where evaporative

1 Households have been allocated coded numbers to enable the researchers to scrutinise data, while providing anonymity to the household residents.

coolers were seen to be operating showed no water use, indicating that they are not connected to the water system; there was excessive wetness inside some meter boxes which may indicate a leak; and two meters could not be read as condensation obscured the figures.

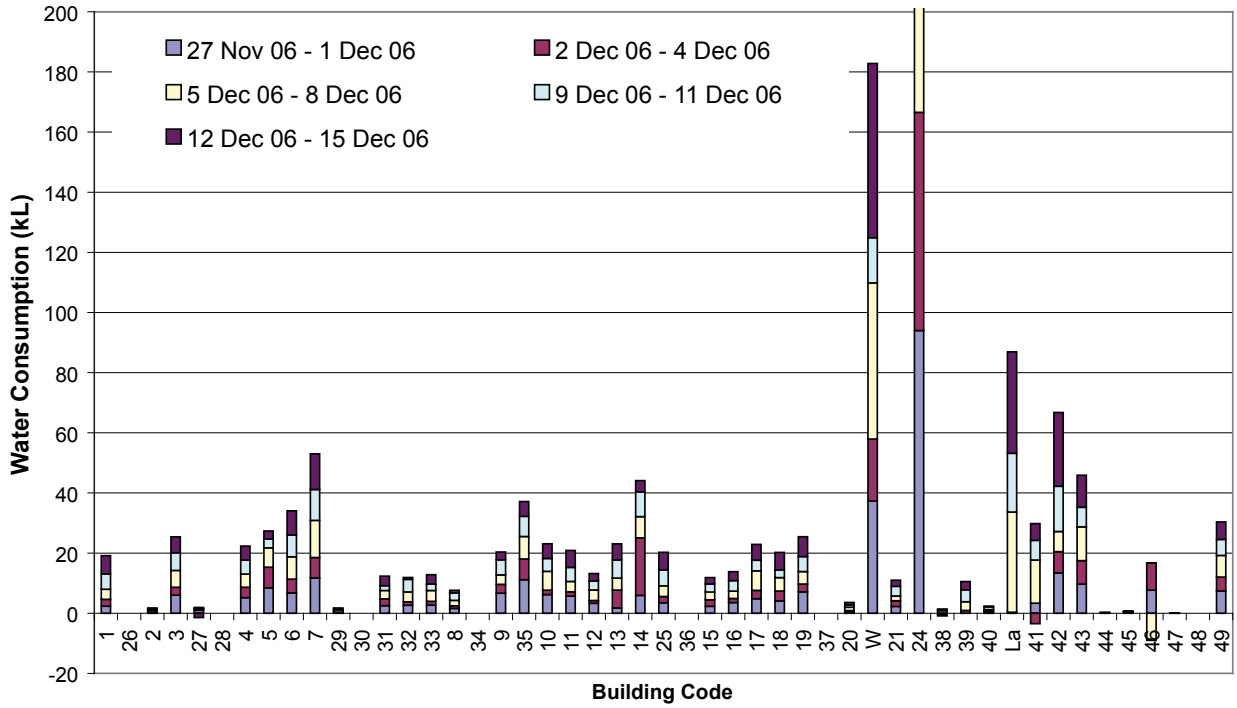

Figure 9.1: Cumulative water consumption (kL) monitored each Monday and Friday between 27 November and 15 December 2006

Note: Wami Kata (W) aged care facility houses 24 people. Lake View visitors camp (La) houses a variable population of up to 60. The negative values indicate houses with a faulty meter connection. Some of the occupied houses show zero water use indicating that the meter is not connected to the water system. Water use at house 24 exceeds the scale of the graph.

The data are therefore limited, but indicate that the infrastructure would need considerable attention before an external agency could read the meters and provide individual households with water bills (notwithstanding the legislative restrictions discussed earlier).

Dichotomous water use

Davenport displays dichotomous water use patterns; that is, there are a number of houses that consistently use very low quantities of water (100 L/p/d or less) and a few that have high water consumption (above 400 L/p/d). Of the 20 houses for which there are consistent valid data, Table 9.1 shows that between eight and fifteen houses are water efficient. Large subterranean leaks within a household property boundary, excessive water use, or carelessness (leaving taps running during absences) in just a few households can account for a sizeable proportion of a settlement's water expenditure. For example, of the 26 houses for which there are reliable data during the summer monitoring period, one house accounts for 46% of the total water use of the 26 houses. As shown in Table 9.2, the single high-user household uses over double the water of multi-person accommodation such as Wami Kata aged care facility which houses 24 people, and around triple that of Lake View (which can accommodate up to 60 people). The average water use at Wami Kata over the 17-day summer period was 448 L/p/d; with weekday water use ranging from 389 to 604 L/p/d and weekend use between 209 and 286 L/p/d.

Table 9.1 Average daily per capita seasonal and long term (179 days) water use

	Average daily per capita water use (L)		
	'Winter' use 19 June to 28 July (38 days)	**'Summer' use 27 November to 15 December (18 days)**	**Long term average 19 June to 15 December (179 days)**
Range of water use	56 to 796	53 to 490	73 to 695
Average in 20 houses	253	235	238
Number of houses using below 100 L/p/d	8	2	6
Number of houses using above 400 L/p/d	4	3	3
Number of houses showing 'average' water efficiency	8 use around 253 L/p/d	15 use around 227 L/p/d	9 use around 192 L/p/d

Seasonal water use

Water use data are available from the SA Water invoices that the community receives on a quarterly basis. Applying the data across the population of Davenport (158) to yield a daily per capita water use is problematic in that it does not consider the variable and sometimes sizeable visitor population (based at Lake View); it apportions water used in community buildings, the office block, Pika Wiya, work sheds and the sports complex across the population; and it apportions any subterranean leaks across the population. Based on the data, the daily per capita water use over a 92-day period from July to September 2006 was 992 L/p/d, while use between October to December 2006 was 1,106 L/p/d. Given the constraints of the data there are limitations to interpretation; however, they provide an indication of seasonal water use. For the community as a whole more water was used in summer (1,106 L/p/d) than in winter (992 L/p/d). Analysis of household meter readings showed that 12 of the 43 households used more water in winter than in summer (Table 9.2), although this may have been influenced by changes in population in those houses. Unlike in Nepabunna, there are no marked trends in water use related to the presence of evaporative coolers. In Davenport, some houses with reverse cycle air conditioning used more water than neighbouring houses with evaporative coolers.

The impact of leaks

Given that some houses used less water in the latter part of the monitoring period it was thought that growing awareness of the drought might account for the improved water use efficiency. As a result, the topic was raised with the community. However, discussions revealed that between the winter and summer monitoring period a number of sizeable leaks had been repaired which would account for the lower water use in the latter monitoring period. This reiterates the need for a detailed audit of the Davenport infrastructure, the ongoing need for an on-site MSO, and highlights the potential for unnecessary water costs to be incurred by the community.

Table 9.2: Average daily household water use in Davenport

House code	Average household water use (L/d)		
	19 June to 28 July	27 November to 15 Dec.	19 June to 15 December
1	791	1,065	752
2	121	97	100
3	901	1,411	1,121
4	1,232	1,242	636
5	2,749	1,520	2,324
6	4,778	1,892	1,363
7	645	2,945	1,392
8	624	425	584
9	474	1,132	618
10	855	1,283	978
11	-	1,160	719
12	309	733	255
13	2,642	1,282	3,429
14	2,743	2,450	3,320
15	1,449	659	2,085
16	390	768	584
17	-	1,273	543
18	2,519	1,123	1,477
19	1,803	1,415	207
20	602	200	317
21	619	611	750
22	269	133	203
23	764	1,463	761
24	-	24,300	-
25	824	1,125	-

Note: In winter (38 days), summer (18 days), and over a 179-day period

Results of the contingent valuation study

As with Nepabunna, a contingent valuation study was conducted in Davenport with a small number of predominantly male, adult residents of the settlement. Participants were asked to comment on the amount of money they might be willing to contribute in hypothetical scenarios:

(1) the installation of water-efficient household fittings (Box 9.2)

(2) the creation of cost-sharing obligations on the community through a successful application for a Commonwealth Community Water Grant.

Participants were also asked to comment on:

(3) receiving a comparative household water use statement (similar to those discussed in Chapter five)

(4) whether a free basic water allowance should exist, and if so, the amount such an allowance should be.

Participants were given fact sheets on each topic to inform and generate discussion, and they were then given time to ask questions and consider the options before responding.

Water-efficient fittings cost a total of $150. If these were installed in your home and all the plumbing services costs were covered (by an external agency) would you be willing to pay:

□ the $150 equipment costs (given that you will recover this money on water savings from lower water bills each year).

□ a once-off contribution of $30 per household towards the $150 equipment and plumbing expenses, but an external organisation must cover the other part ($120). [This is what the Queensland Government is offering residents in SE Queensland].

□ some financial contribution, but less than $30, perhaps $……..in total

□ some financial contribution, more than $30, perhaps $……in total

□ nothing towards the costs, because……..

□ I don't want these water saving fittings in my house, because ……

Box 9.2: An excerpt from one of the contingent valuation questionnaires answered by the focus group members

Given the small number of respondents, the results are not statistically valid, but they provide an indication of the feelings of a sector of the population. In the hypothetical scenario outlining the installation of water-efficient household fittings (Box 9.2), all the respondents stated that they would be willing to contribute $30 towards the installation of the fittings in their homes because 'we're going to save in the amount of water used'.

In a second hypothetical scenario, respondents were asked what they would request and whether they would contribute towards a Community Water Grant – again, the respondents were unanimous in their willingness to contribute a nominal sum, and in their desire to have rainwater tanks plumbed into the laundry and toilet system. In addition, there was a strong desire to have access to recycled water or a borehole to irrigate the oval and community areas, but it was thought the cost would exceed a Community Water Grant allowance (of up to $50,000). Larger-scale projects requiring greater expenditure fall under the Water Smart Australia funding scheme. Some of the newer houses in Davenport have solar hot water systems and some respondents in older houses expressed an interest in having solar hot water systems installed.

All the respondents expressed an interest in receiving a comparative water statement (showing comparative water use in Davenport and Port Augusta, as outlined in Chapter five – see Figure 5.8), adding that such a statement would help reduce wastage.

Not all respondents answered the questionnaire on a free basic water allowance, but those who did respond felt that a free water allowance of 100 L/p/d should be available to low income households. For the hypothetical family (3 people) a free basic allowance of 100 L/p/d would equate to a subsidy worth $119.36 each year (300 L/family/d x 365 days x $1.09/kL = $119.36/year), with only water use above this sum being charged. In South Africa, in 2001, the government issued a policy to ensure that every household receives a free basic water allowance of 6 kL/month (or 200 L/household/day; Water Research Commission 2005). In Davenport if each house was granted this amount it would equate to a $79.57 reduction in the annual water bill. In Christchurch, New Zealand, property owners are charged water rates according to the capital value of their property. Christchurch City Council does not charge domestic users for water but monitors and informs households with excessive use.

Suitable water saving strategies and technologies

Based on the results of the contingent valuation study and related focus group discussion, a number of water saving technologies appropriate and acceptable to Davenport residents are discussed below. In addition to those mentioned above, the role of water auditing is outlined.

Domestic rainwater collection

Long-term climate data (over 102.5 years) shows that Port Augusta has an average annual rainfall of 242.8 mm (Bureau of Meteorology 2007). To determine the amount of rainwater that could be harvested, Davenport data was applied to the equation (Chapter three) as follows: in November 2002 a survey of the building layout and infrastructure of Davenport settlement was conducted for the Department of Aboriginal Housing (T Forgan 2006, pers. comm.[2]). A computer-generated calculation of the solid roof area (i.e. excluding pergolas) of all residential, non-residential buildings, and sheds in Davenport yields a total roof area of 11,023 m^2, that is, the roof area from which rainfall could be collected. For a rainfall of 242.8 mm, a loss of 24 mm each year (B in the equation) amounts to around 10% of the annual rainfall. The maximum volume of runoff that can be generated from the roof area in Davenport is 2,047,595 L each year. This volume of rainwater would fill over 108 large rainwater storage tanks each with a capacity of 18,925 L (i.e. similar to those in Yarilena shown in Figure 7.2).

Figure 9.2: Rainwater for potable use in one of two houses at Davenport where trials are being conducted

Despite the capacity for domestic rainwater collection there are relatively few rainwater tanks in Davenport. The reason for this is partly because rainwater is only considered as a potable resource, and following the installation of evaporative coolers on the roofs of houses in the mid-1990s, there was the perception that water flowing from evaporative coolers onto the roof would render rainwater unfit for human consumption (Willis et al. 2004). There are around 27 buildings or sheds with rainwater tanks. A few are not connected to a roof (and therefore receive no input), are of a small capacity (1,000 L), or are partly rusted. A minority are useable (i.e. of an appropriate capacity and connected to a roof). In total, the estimated rainwater collection is less than 10% of what could be collected. Rather than viewing rainwater solely as a potable resource, in Davenport there is scope for the community to consider rainwater as a non-potable resource; that is, each house should be fitted with two 18,925 L rainwater tanks plumbed into the laundry and toilet, with the associated protective non-return valves installed. Rainwater could also be used in gardens and for car washing. There are two houses where rainwater for potable use is under trial. The tanks have a small capacity (as shown in Figure 9.2) but are fitted with protective first flush and filtering devices to minimise health risks.

2 Licensed Surveyor, Sinclair Knight Merz

Recycled water

As in 2002 (Willis et al. 2004), the community expressed a strong desire to use recycled water. The successful use of recycled water for beautifying parts of the Port Augusta town environment (Figure 9.3), is a constant reminder of the potential for Davenport.

Figure 9.3a: Recycled wastewater, treated to Class B irrigation water, is used in the greening of the Port Augusta Foreshore Redevelopment zone

Figure 9.3b: In contrast, Davenport settlement is in need of greening

The community expressed an interest in the Water Smart Australia scheme to fund an extension of the recycled water pipeline to Davenport. The settlement is located on a direct route less than 4 kilometres (Figure 9.4) from the eastern Port Augusta Foreshore Redevelopment zone. Therefore the cost of extending the recycled water pipeline to Davenport should not be prohibitive.

Figure 9.4: The proximity of Davenport settlement to the eastern Port Augusta Foreshore Redevelopment zone – a distance of less than 4 kilometres along a direct route

Source: Google Earth

SA Water, which operates two wastewater treatment plants in Port Augusta, supplies wastewater to Port Augusta City Council at no cost. The Port Augusta City Council has developed a wastewater treatment facility that when fully operational will produce 150 ML of water treated to Class B each year (ABC News 2005b). The project, which cost $900,000, was funded by the Port Augusta City Council (two-thirds of the cost) and the state government (a third of the cost). The state government funding was through the River Murray Environmental Flow Fund on the basis that the council needed to irrigate parks and sporting facilities without extending their reliance on Murray River supplies. The system currently irrigates some park lands, council gardens, some council and Education Department ovals, and the Foreshore Redevelopment (Shine 2005). The treatment plants operated by SA Water are Port Augusta West, with a capacity of 1.26 ML/day, that services the western part of the town (west of the Spencer Gulf), from which 90% of the treated wastewater is reused (in 2004/2005); and Port Augusta East with double the capacity at 2.66 ML/day, which

services a population of 5,000, but from which there is no wastewater reuse (SA Water 2006c). With reference to the volume of wastewater produced, there is potential for more of the water to be recycled. Treating wastewater for reuse is an expensive process; the greater the level of treatment, the broader the range of uses permitted under Department for Human Services guidelines. Depending on the level of treatment, wastewater is classified into different classes. To be classified as 'Class B' water (Port Augusta) the wastewater undergoes full secondary treatment followed by disinfection; the suspended solid content should not exceed 30 mg/L. Use of Class B water is restricted to secondary direct contact recreation, ponds where there is public access, and dust suppression and irrigation provided there is restricted public access during spraying (Environment Protection Agency 1999). It is this latter restriction that potentially limits the use of recycled water in Davenport; a subterranean irrigation system would be necessary.

Besides the irrigation value of using recycling water, there is the added environmental benefit that less wastewater is discharged into the Upper Spencer Gulf – a marine environment with limited assimilative capacity for wastewater due to its hydrography. Port Augusta prison also uses recycled water. In 2001, an onsite wastewater treatment plant was built at the prison to irrigate an onsite woodlot for timber and a few hundred thousand native seedlings for distribution to the state's national parks. The treatment plant was financed through a joint venture between Greening Australia and National Parks and Wildlife Service (South Australian Department for Correctional Services 2001).

Water audit

One of the main areas for reducing water costs to the community is by using water more efficiently on a domestic scale. It is therefore recommended that household water audits be conducted throughout Davenport. To this end, two members of the Community Council attended a two-day training course on 'Water auditing on remote communities' run by the Centre for Sustainable Arid Towns (CSAT), in Alice Springs in February 2007. CSAT has conducted water audits in the Aboriginal settlements of Gunbalanya, Santa Teresa and Canteen Creek in the Northern Territory. The course outlined how water use can be monitored, covering topics such as the patterns of water use in settlements, houses and gardens; the role of hardware such as taps and hot water systems; the role of maintenance and education; monitoring strategies and equipment; how to read water meters; how to install and download data from data loggers; and calculations and data analysis.

It is estimated that by taking proactive steps on the results of a water audit, 'typical' households can save almost half of their annual water use (WaterCare undated). Conducting water audits can be very simple, yet effective. The SA Water self-audit rates water use in the garden and outdoors, the bathroom, toilet, laundry, kitchen, taps and leaks, and the water source; and provides a water smart summary and tips for water savings (Table 9.3).

Table 9.3: Excerpts from a simple 'Home Water Self-Audit'

Bathroom

	Your water use is closest to...			
How do you use water?	High water use	Moderate water use	Water efficient	Water smart actions
What is your shower flow rate?	15 litres per minute or more	Between 9 and 15 litres per minute (score 2)	9 litres per minute or less (score 4)	Low- flow showerheads give a great shower with less water. They are not suitable for gravity fed and some gas hot water systems.
What are your showering and bathing patterns?	Frequent long (>8 mins) showers	Medium length showers and occasional baths (1)	Short showers (<3 mins) as required (3)	A bath can use well over 100 litres of water. A short shower can use less than 30 litres of water
Your total	**0**			**= /7**

Toilet

	Your water use is closest to...			
How do you use water?	High water use	Moderate water use	Water efficient	Water smart actions
What type of toilet do you have?	Single flush	Dual flush or fitted with a water saving device (2)	Composting toilet – uses no water (4)	Single flush and some dual flush systems use large amounts of water. Dramatically reduce water use by installing dual flush systems or by modifying your existing system.
Your total	**0**			**= /4**

Laundry

	Your water use is closest to...			
How do you use water?	High water use	Moderate water use	Water efficient	Water smart actions
What type of washing machine do you use?	Standard top loader	Top loader with suds saving (2)	Front loader or AAA rated top loader (3)	Front loading washing machines use 1/3 less water than top loaders.
How full are your loads of washing?	Often small loads		Usually full loads (2)	Use full loads as much as possible. Adjust the load setting on your machine if it isn't full.
Your total	**0**			**= /5**

Kitchen

	Your water use is closest to...			
How do you use water?	High water use	Moderate water use	Water efficient	Water smart actions
How do you wash dishes?	With a dishwasher	A dishwasher, full loads only (score 1)	We always wash by hand (2)	If you use a dishwasher ensure that it is full when you run it and use the economy cycle if possible
Your total	**0**			**= /2**

Water source

	Your water use is closest to...			
How do you use water?	High water use	Moderate water use	Water efficient	Water smart actions
What sources of water do you use?	Mains water only	Some use of rainwater (2)	Extensive use of rainwater and greywater (5)	Reduce the amount of mains water you use by installing a rainwater tank and plumbing it into the house. Reuse greywater for irrigation.
Your total	**0**			**= /5**

Water Smart Summary

How you use water	Your score	What you can do	By when	Tick when done
Garden	/25			
Bathroom	/7			
Toilet	/4			
Laundry	/5			
Kitchen	/2			
Taps and leaks	/4			
Water source	/5			
Total	**/52**	**36 – 52 Efficient water use** **11 – 35 Moderate water use** **0 – 10 High water use**		

Conclusion

Davenport has scope to reduce their water bills by up to 50% through a few simple strategies. Firstly, with two members of the community recently trained in water auditing, it is recommended that a water audit be conducted on all buildings within Davenport and any areas needing attention from a plumber identified, opportunities to install water efficient fittings itemised, and the residents' awareness raised in the process. The subsequent savings on the settlement water bill could be used to offset the cost of the fittings. Secondly, it is estimated that less than 10% of the rainfall that could be collected is harvested from settlement roofs – there is scope for the housing authorities to maximise this potential water source or for funding to be requested through a Community Water Grant. A third, more complex strategy, is develop a proposal to extend the recycled water pipeline from the Port Augusta Foreshore to Davenport. The community is eager to use recycled water – it is therefore recommended that this be further investigated, and if necessary funded through a Water Smart Australia scheme.

Water use savings could be made as a result of responses to a water audit, and greater use of rainwater in the laundry (as opposed to mains water). Together with a free basic water allowance (of 100 L/p/d or $100/household/annum), such changes could provide the incentive for households to live within a water allowance and therefore not incur any additional water use costs. Given the impending introduction of individual household billing for water, and the levels of poverty in the community (Chapter eight), the above-mentioned technologies and responses are likely to achieve desirable outcomes for the community (in cost savings) and for the state (in helping to meet the NWI objective of more efficient water use).

Chapter ten: Conclusion and recommendations

Introduction

This project engaged communities in discussions about strategies to reduce their individual household and overall settlement water costs. In taking this approach it was recognised that water costs could be reduced in three ways: through technological and infrastructure improvements; through improved water use efficiency; and through economic/financial incentives. In summary the project sought to:

- provide an economic appraisal of water costs to households through cost of living analyses
- explore ways that water costs to households could be reduced through water conservation practices or water-efficient technologies (while simultaneously promoting the sustainability of water resources)
- use a hypothetical (contingent valuation) exercise to engage Nepabunna and Davenport communities in discussions about their willingness to pay for the implementation of water-saving or sustainable water technologies.

Comparisons between the four settlements

The differences in recommendations related to the implications of the introduction of user pays for water services are, in the first instance, a reflection of the impact of the cost of living in each of the four settlements. They are also a reflection of the historical background, type of water supply and current federal and state policy for Aboriginal settlements. When we began this study in 2005 only one settlement, Nepabunna, did not formally or informally pay for its water or water infrastructure, and the community regard their water as sub-optimal. Davenport, on the outskirts of Port Augusta has paid for its water use for close to seven years and the quality of their water is satisfactory. Both these settlements' water infrastructure are funded through the Commonwealth-State Bilateral Agreement on Essential Services with the contract for settlement-based infrastructure outsourced to SA Water since 2003. The involvement of SA Water at Nepabunna is only as part of a contractual obligation with the state government and is not part of mainstream water service provision. Yarilena and Scotdesco are not covered by the Bilateral Agreement and were originally funded through ATSIC. Scotdesco now comes under the portfolio of the Commonwealth Department for Families, Community Services, and Indigenous Affairs (FACSIA), who are also increasingly using SA Water to advise it on suitable water solutions for Aboriginal settlements. Both Yarilena and Scotdesco were originally homelands composed of one or two large extended families. Likewise, Nepabunna residents share family ties, which makes internal decision making easier than in more disparate settlements. This is not the case for Davenport, which is composed of three distinct groups with ties to the Arrente, Pitjantjatjara and other Aboriginal groups.

Objective 1: to conduct an economic appraisal of the water costs to households

The first objective was to conduct an economic appraisal of the water costs to households through a cost of living analysis (a summary of the findings is given in Table 10.1). The cost of living analysis also examined the *capacity* of each community to pay for water, or pay for future improvements in the efficiency of their water supply.

Table 10.1: The water costs borne by households or the settlement (as a whole), responsibilities for water services and maintenance, and proportion of income spent on water

	Nepabunna	Yarilena	Scotdesco	Davenport
Household water costs (per week)	0	$5	$5 for 1st tenant + $10 for each additional person	$15
Settlement water costs (per week)	0	~$500 includes: SA Water supply, Water West membership; and excludes: sewage levy, internal infrastructure maintenance	$461 for RO membranes only, excludes other RO maintenance and pumping costs	-
Water service provider	SA Water under contract to AARD	SA Water to the settlement boundary	Internal responsibility	SA Water (to the gate) under contract to AARD
Cost of water	It costs AARD $4.31 per kL (excluding maintenance)	The standard SA Water rates of $0.47 for 1st 125 kL, then $1.09/ kL, plus community access charge $3.00/week Water West membership is $15 /week (while on SA Water)	It costs ~$25.00 per kL; this is not charged, but is based on operating, maintenance, pumping costs	The standard SA Water rates of $0.47 for first 125 kL, then $1.09/kL plus access charge $3.00/week
Internal infrastructure maintenance	Periodic plumbing maintenance paid by AHA funds	Paid out of Yarilena Trust funds A builder in the community does much of the maintenance work	An MSO does basic services Contractors are used for specialised RO maintenance	An MSO is a local contact Plumbers as needed
Income of an average family (per week)	$552.82	$609.75	$507.22 family 1 $764.73 family 2 $254.91 family 3	$476.82
Expenditure on water (% of income)	0% to households, SA Water costs are covered by AARD	0.8% to households, excess costs are covered by the Yarilena Trust funds	3.0% 3.3% 2.0% respectively	3.1%
Percent of income spent on basic food, health, and utility living expenses only	86%	85%	93% 82% 130% respectively	104%

As noted in Chapter two, there are considerable methodological difficulties using the cost of living analysis with Aboriginal settlements. For example, gaining access to reliable data is problematic, and issues of remoteness and misunderstandings across language and cultural divides mean that population and related data on household and family composition, size, employment and income are at best an estimation. However, the estimation of living costs for the hypothetical families in the four settlements are consistent with the findings of the ABS Household Expenditure Survey for 2003–2004 (2005).

Table 10.1 shows that in the four settlements, expenditure on water ranges from 0.8 to 3.3% of their weekly household income. By comparison, the state average for non-Aboriginal South Australian households is 1.2% (Pearce et al. 2006). These figures are similar to those given by Stephenson (1999) for developed countries (around 1–2% of income). In contrast, there is a greater range in expenditure among poorer communities; for example, Komives and Prokopy (2000) found that

the average household expenditure on water ranged from <1% of the average monthly household income in Barrio Villa Jardin, Argentina and El Alto, Bolivia, to between 8–16% in Makunda, Jakarta and over 20% in Cape Verte, Senegal.

Of greater significance than the percentage of income spent on water, is the proportion spent on basic food and health items, which provides an indication of the implications for the standard of living if household water costs were to increase. Table 10.1 shows that 82–130% of income is spent on basic living; therefore, there is little capacity to increase household water payments in Yarilena, Scotdesco, and Davenport or to introduce water charges in Nepabunna.

Nepabunna

The weekly income for May 2006 was established at $552.82, just $5.91 above the Henderson poverty line (Melbourne Institute of Applied Economics and Social Research 2006). The cost of living included food, health consumables and health hardware, along with utility costs such as electricity, telephone and transport. A car is an essential item for Nepabunna residents given that the settlement does not have a store, and the nearest store is at Copley (a distance of 65 kilometres) or Leigh Creek. The total cost of living came to $452.89 per week, or 86% of total income.

The cost of living study shows that not all families at Nepabunna are on incomes as low as that of the hypothetical family. Some families, such as pensioners, are likely to have less income, while a small number of families where both adults are employed or are on a wage, may earn more. The hypothetical family presents a scenario close to the mean suggesting that the majority of families are clustered around this income. Importantly, the figures used to estimate the weekly menu, travel costs and car repayments are set at the lower end of the spectrum. This kind of lifestyle would be difficult for any family to sustain, and in the long term would be counterproductive to their health and wellbeing. In comparison to the *Australian Guide to Healthy Eating* (AGHE), the weekly menu is not ideal for groups susceptible to diabetes and other lifestyle diseases. Families on higher incomes might live a similar lifestyle for a short period of time in order to save for a holiday, or to buy a large household item such as a car or refrigerator, but they would find it difficult to sustain over a long period.

The data suggest that any increase in the cost of living, such as a move to user pays for domestic water supply would put a strain on families at Nepabunna and it is recommended that this does not occur. A move to full cost recovery at Nepabunna would seriously compromise the community's health by transferring money away from what is needed for healthy living. However, as noted in Chapter four, potential does exist for a small amount to be paid in cases where there is significant overuse of water; there is some support within the community for this, provided it is means tested and linked to transparent evidence of comparative use. Despite support for this action we do not recommend it, as it would be difficult to implement this strategy for a number of reasons. Firstly, the number of residents and visitors living in the Nepabunna households varies from day to day. Secondly, it would require employing someone to regularly read the meters (and note the corresponding population). Thirdly, it could be difficult to implement, as the person reading the meters might be seen to be accusing individuals of excessive water use, which could lead to antagonistic relationships, and little protection could be offered to that person.

Yarilena

While residents at Yarilena enjoy a higher income than those at Nepabunna it is still low. The hypothetical family for Yarilena was composed of two adults and two children, with both adults in receipt of CDEP income. This provided a weekly income of $609.75 (which is 3% below the poverty line), and the cost of essential food, health consumables and hardware was $597.34, or 97% of income. The expenditure on food at Yarilena is more than at Nepabunna, but this is understandable given the different diet of Nepabunna residents, and the easy access Yarilena residents have to Ceduna. Residents at Yarilena already pay for all utility costs: electricity, telephone and water. While the proportion of the average income spent on water is low (0.8% of income; see Table 10.1), the costs borne by the community as a result of leaking pipes has put considerable strain on community finances. If the expense of the water associated with the leaking infrastructure were borne by individual households, each family (hypothetical) would need to pay $35.08 per week (or 5.8% of income) rather than $5 (0.8% of income) to cover the costs.

Scotdesco

The income for hypothetical families in Scotdesco ranges from $254.91 for a single person to $764.73 for a family comprising three adults. In all cases the household income is marginal, yet residents pay for all utility costs. The proportion of income spent on water alone ranges from 2 to 3.3% of income. The estimations of income are exaggerated given that the only available work is CDEP, which is highly seasonal, and national research indicates that a significant number of rural-based CDEP participants do not earn an income for the full twelve months of the year (Hunter 2002b). Similar to Yarilena, Scotdesco has severe infrastructure issues with their water supply, and recent research by SA Water estimates that the current cost of water is $25 per kL (SA Water 2006b). A move to full cost recovery is not viable for any population where water costs are so high, let alone Scotdesco, where incomes are dependent on seasonal work and CDEP. Scotdesco residents will continue to require government support for major capital works into the future. The ideal solution would be to provide low maintenance, low cost infrastructure such as rainwater harvesting, and for the community to continue to put aside money for repairs and maintenance of the lower cost alternatives.

Davenport

The hypothetical family at Davenport was identified as two adults, both unemployed, and one child under 13. The cost of living was calculated to be $496.60, or 104.1% of the total weekly income of $476.82. This is 16.8% below the poverty index (of $557.13). Householders pay $15 per week for their water, which equates to around 3.2% of their weekly income.

Objective 2: to identify ways in which water costs to households could be reduced

The NWI requires new services or the refurbishment of existing infrastructure to be environmentally and economically sustainable. The second aspect of this research was therefore to explore ways in which household water costs could be reduced through water conservation practices with concomitant improvements to the sustainability of the supply. The key findings of the study are summarised in Tables 10.2 and 10.3.

Table 10.2: Water supply, use (excluding rainwater) and water saving technologies appropriate to the four settlements

	Nepabunna	Yarilena	Scotdesco	Davenport
Current water supply	Groundwater (non-potable) Central rainwater collection from basketball stadium (potable)	Reticulated SA Water supply Rainwater collection at each house provides >21% of water use	Groundwater desalination (potable) Collection of rain from roofs	Reticulated SA Water supply from Murray River (potable) Minimal rainwater collection
Water use	435 L/p/d	208 L/p/d	141 L/p/d	73 to 695 L/p/d
Excess water users	1. Evaporative coolers can use >960 L/d and account for most water use in summer 2. One or two households have excessive water use	1. One or two households have higher than average water use, but showed improved efficiency later in the monitoring period	Insufficient data	1. Faulty meters and leaking infrastructure account for a portion of unnecessary water use 2. A number of households have excessive water use
Appropriate technologies and strategies aimed at reducing reliance on current water resources and reducing excess water use	1. Passive cooling features in housing would reduce reliance on evaporative cooling 2. Provide residents with a monthly comparative water use statement. Charge for excessive water use only, following an advisory period 3. Install dual flush toilets, waterless urinals and aerators in all community buildings 4. Increase rainwater collection in the community centre and plumb it into the toilet system 5. Install a 2nd large roof-based rainwater collection system to supplement and lower the salinity of groundwater supplies	1. A third 18,925 L rainwater tank should be installed at each house. While it will only save around 5% of household water costs annually, it is a long-term sustainable saving 2. Reinstate the irrigation system from the onsite STED ponds, which have fallen into disrepair	1. Install additional rainwater tanks at each house 2. Install a large scale ground-based RWH system, with UV treatment prior to reticulation 3. Install composting toilets in the community centre as an initial trial	1. The community should recognise rainwater as a non-potable resource and install more tanks at each household with plumbing into the toilet and laundry 2. Conduct a household water audit of internal fittings, their status and the potential for replacement with water efficient fittings 3. Extend the treated effluent pipeline from the Port Augusta Foreshore to Davenport for subterranean irrigation of the oval and to 'green' the environment

Table 10.3: Other ways of reducing household water costs in the four settlements and potential funding agencies for water saving technologies

	Nepabunna	Yarilena	Scotdesco	Davenport
Other means of reducing household costs (with no water resource savings)	1. Maintain subsidies for water 2. Install solar hot water systems to reduce electricity costs	A move from SA Water onto the Ceduna-Koonibba pipeline will address the costs associated with leaking internal infrastructure which has accounted for between 40–60% of the water bill. However, the unit cost of water will be marginally more and a CSO subsidy will not be available	Install solar hot water systems to reduce electricity costs	1. Maintain subsidies for water by providing all residents with a free basic water allowance (100 L/p/d) with charges for excess water use only 2. Install solar hot water systems to reduce electricity costs
Other recommendations to external agencies	1. Meter the potable supply as it forms an integral component of the available water resources 2. Conduct test pumping in the two bores to determine the sustainable pumping rates	-	Community members should evaluate other ground-based RWH systems in the region so they can make informed decisions regarding RWH	1. Maintain the presence of an MSO within the settlement 2. Contract SA Water to evaluate the status of all meters and settlement water reticulation system (to the boundary of each household)
How the technologies might be funded	Commonwealth Community Water Grant; Water Smart Scheme; AARD	Apply for NHT funds to re-fit the greywater irrigation scheme	FACSIA Grant; Community Water Grant	AARD; Community Water Grant; Water Smart Scheme

Objective 3: to engage communities in discussions about their willingness to pay for the implementation of water saving or sustainable water technologies

The third objective was aimed at engaging Nepabunna (Table 10.4) and Davenport (Table 10.5) communities in discussions about the levels of water service delivery that they might be willing to contribute towards. In each hypothetical scenario presented, participants had an opportunity to state that they did not want such technologies and to give reasons if they wished.

The findings at Nepabunna suggest that it is not that the community is unwilling to pay, but rather it is a matter of their *ability* to pay for water. This response is a shift in attitude from that voiced some years ago (Pearce et al. 2005) which asserted the principle of not having to pay for what was regarded as a cultural right. Although those feelings still exist, there is now more concern over the affordability of essential services, including water. The participants questioned whether households with high water use had the *means* to pay for excess water use, although they had previously stated: 'If you gotta pay for water it means we're not going to waste it, isn't it?' As noted in Chapter five, one of the reasons people 'just walk away' from town living and move to a remote independent settlement such as Nepabunna is the burden of mounting debts associated with rent and utility costs.

Table 10.4: Results of the discussion on the Nepabunna community's willingness to contribute towards a range of hypothetical, (but realistic) water saving and resource extending technologies (contingent valuation study)

Hypothetical scenario In (1) and (2) capital expenditure would be borne by an external agency, with the community asked to contribute $5/fortnight to ongoing maintenance costs of the system.	**Willingness to contribute to the scheme**
1. Supplement the current non-potable supply with groundwater from an additional new bore, perhaps on a shared basis with Iga Warta. This would entail investigative drilling and test pumping and significant installation and pipeline costs.	Concern around the affordability of this option due to their low income.
2. Install a large roof-based rainwater harvesting system similar to the basketball stadium collection system but over a new dome that could be designed for BBQs and other social events.	
3. Install $150 worth of water-efficient fittings (dual flush toilets, AAA showerheads, aerators) within each household. The bulk of the expense would be covered by an external agency with each household asked to contribute a one-off payment of $20, $10, less than $10 or nothing towards the fittings.	The community felt this was a move 'backwards'.
4. Provide each household with a comparative water use statement to help promote water use efficiency (not a financial request).	Yes
5. A free basic water allowance with charging only for excess water use.	Yes, but it would be difficult to implement. High water users could feel 'victimised' and it could lead to antagonistic relationships. It would require means testing the household.

Residents at Davenport were very responsive to the range of options put to them during the contingent valuation exercise. This may well be because they already pay for water and electricity. Community members also responded positively to the proposal that they contribute to the installation of a range of water-efficient fittings such as dual flush toilets and AAA shower heads. Similarly, they were prepared to make a contribution by way of funds or labour to enhance their bid for a Community Water Grant. This willingness to contribute should be judged in the light of the outcome of the cost of living analysis. As already noted this study found the hypothetical family at Davenport to be the poorest of the four settlements with their income 16.8% below the poverty line. The Davenport figures were based on the fact that a higher percentage of Davenport residents are unemployed than at Nepabunna, Yarilena or Scotdesco, despite their proximity to Port Augusta and possible employment opportunities beyond CDEP. In the four years we have conducted research at

Davenport community members have expressed a strong desire to access either recycled water or a borehole to irrigate the oval and community areas, although community members are mindful of the costs. What must also be recognised is that opinions at Davenport are contingent on the outcome of current discussions that deal with amendments to the Municipal Services Act (outlined in later parts of this chapter).

Table 10.5: Results of the discussion about Davenport community's willingness to contribute towards a range of hypothetical (but realistic) water saving and resource extending technologies (contingent valuation study)

Hypothetical scenario	Willingness to contribute to the scheme
1. Install $150 worth of water-efficient fittings (dual flush toilets, AAA showerheads, aerators) within each household. With each household asked to contribute a once-off payment of $150, $30, less than $30 or nothing towards the fittings.	$30 per household
2. Community Water Grants require some form of financial contribution, in-kind support through labour, and promotional activities from the successful recipient.	Yes
3. Provide each household with a comparative water use statement to help promote water use efficiency.	Yes
4. A free basic water allowance, with charging for excess water use only.	Yes

Compounding issues for the four settlements

The situation for Aboriginal communities meeting the high cost of services is often more complex than that for other citizens. This is partly a result of where Aboriginal people reside, but also of the history surrounding the development of settlements. Any move to user pays or full cost recovery for domestic water supplies needs to consider the following factors: the need for adequate provision of subsidies for utilities to Aboriginal householders; realistic employment prospects for Aboriginal people in remote and rural areas; and the implications of the federal government's policy of mainstreaming for those settlements on the fringes of large rural towns such as Davenport.

Lack of access to subsidies for water services

Subsidies or concessions that aim to spread the costs of essential services more equitably across the community are of two kinds. The first form of subsidy is the CSO. Under these provisions householders in rural and remote areas are charged a rate similar to costs in urban areas as a matter of equity. Accessing the CSO is not automatic, nor is it transparent. The second kind of subsidy is a range of concessions and allowances offered by utility providers and government welfare agencies. In South Australia, the state government Department of Children, Youth and Family Services, administers a range of concessions to low income families to meet the costs of water and sewerage. Eligible recipients must own and occupy their residences, non-home owners are not eligible (Government of South Australia 2007).

SA Water provides rebates for pensioners in cases where they have a Pensioner Concession Care or a state concession card, or are a TPI pensioner, war widow or have received confirmation of concession card entitlements. However, recipients of Department of Children, Youth and Family Services subsidies must be an owner or part-owner of their property, reside there and be responsible for paying rates and land taxes. In 2006 the concession allowed for up to $95 a year for water rates and use, and $95 per year for sewerage rates (SA Water 2006d). Likewise, Centrelink provides a utilities allowance to aged and veteran pensioners in receipt of income support. The rate in 2006 was $105.20 for singles and $52.60 each for eligible couples (Centrelink 2006).

Aboriginal people living in discrete settlements are not the owners of the houses in which they live, and therefore are not eligible for the concessions outlined above. While there are moves to allow Aboriginal people residing in a discrete settlement to purchase their homes, there are a number

of hurdles not yet resolved. For example, the most recent attempts in the Northern Territory to allow residents of the town camps in Alice Springs to buy their own homes has been stalled by the requirement that the people hand over lease-hold of their land to the Northern Territory Government. On the other hand, Aboriginal people living in Housing Trust homes in rural towns or in urban areas are not required to pay electricity, water or council rates, as these are the responsibility of the Trust. This is often also the case for those renting from the private sector. In the case of the settlements examined in this report, the landowner is the Aboriginal Lands Trust (ALT). Presumably, if the utility costs were paid by the ALT, they would wish to charge property rentals that would cover the costs of the utility services. Increases in rent would cancel out any gains.

Aboriginal property renters (non-home owners) are eligible for the programs offered by SA Water, AGL and other utility providers for customers having difficulty meeting monthly, quarterly or half-yearly accounts. These providers make provision for customers to make weekly or monthly payments or to pay large accounts in manageable amounts. Customers have to notify the provider of the difficulties they are experiencing and arrange for a change of payment option. While this is an option for Aboriginal settlements, as Willis et al. (2004) note, Aboriginal householders in rural and remote regions report difficulties in communicating with utility providers unless they have local office staff who can handle this service.

The issue of access to utility subsidies needs to be resolved for Aboriginal people living on settlements where they are not the landowner or landlord.

Current arrangements in place in remote Aboriginal settlements for the collection of money to cover water costs

Research by Willis et al. (2004) indicates that a number of remote Aboriginal settlements are already paying for the water services that are delivered to each household, but the community receives one account for the cost of the water delivered to the gate. This arrangement requires the Community Council to put into place some arrangement for collecting sufficient funds to meet these repayments. Various approaches are in place. In some settlements the council collects a flat rate each week, in others the meters are read and householders are billed accordingly.

The question of whether the Community Council should be responsible for collecting charges is vexed. As Willis et al. (2004) note, the collection of rent and other utility costs is stressful in some situations. Community Councils do not have the powers vested in local government or the weight of the law behind them. Further, they live close to households experiencing difficulty meeting weekly rental payments and this complicates decision making.

In those settlements such as Davenport where the federal government has ruled that they will move to mainstream services, several issues still need to be resolved. All houses will need to have working water meters attached, but more importantly, the issue of SA Water access to each household meter remains problematic. Until this issue is resolved legally, it is not possible to move to individual user billing at Davenport or any other Aboriginal settlement. Legal issues governing access to Aboriginal Land by utility providers must be resolved before the federal government withdraws funding for municipal services.

Opportunities for mainstream employment beyond CDEP

This analysis has used a range of hypothetical households from Nepabunna, Yarilena, Scotdesco and Davenport. The weekly incomes were sourced from CDEP figures, or in the case of Davenport, from unemployment figures. It could be argued that the financial situation for community members

should improve over time with a shift to mainstream and full-time employment; however, the research team believes this is highly unlikely. Recent research by Hunter (2002a) suggests that while the CDEP has been successful in providing employment for Aboriginal people, there are a number of features of the program that mean that it is not likely to act as a bridge to mainstream or full-time employment. There has been a shift in labour market characteristics across the rural sector with a decrease in unskilled and semi-skilled jobs, particularly for males in the 15–24 year bracket and a tendency for Aboriginal youth to see CDEP as an alternative to staying on at school. While there has been an increase in the number of Aboriginal adolescents staying on to complete high school, CDEP has acted as an alternative. The high number of males in the age bracket 15– 24 at Scotdesco on CDEP suggests that this has been a trend in this settlement.

A third important point raised by Hunter (2002a) is that much CDEP work is seasonal. In this report, incomes have been based on CDEP payments across a twelve-month period. It is possible that a number of community members would be seasonal workers, bringing annual incomes down below the estimates we provide. Indeed, Hunter (2002a) notes that the average CDEP worker is employed for approximately ten months out of twelve in any year and the population fluctuations at Scotdesco, Nepabunna and Davenport support this.

Conversely, it is also possible that community members might supplement their CDEP incomes with full-time employment or additional part-time work in mainstream jobs. While this may be the case for some members, it is highly unlikely in the case of Scotdesco and Nepabunna given the distance from the nearest large town and the loss of unskilled and semi-skilled jobs in rural and remote regions (Hunter 2002a). While jobs are available in Leigh Creek, the company, Flinders Power (formally NRG), has a tendency to employ people from outside the region. In further work, Hunter notes that Aboriginal people are less likely than non-Aboriginal people to migrate in search of work (Hunter 2002b). Information obtained as part of this research suggests that travel is restricted to those towns and settlements where people have relatives. There is some expectation at both federal and state levels that unemployed people will travel to find work, or as in the case of mining, commute on a rotational basis between their home and work-site. While we found some evidence of this at Nepabunna and Scotdesco, it is not a widely held practice, and it raises questions about the consequences of causing significant shifts in social structures. A situation where the majority of working adult males were away working on mining sites would hollow out these small settlements and create further instability within families. Consequently, Hunter's (2002a) assessment that CDEP accounts for 50% of Aboriginal employment in rural and remote regions is likely to continue to be accurate. Residents at Nepabunna, Scotdesco and Yarilena are likely to be dependent on CDEP for some time to come; accordingly, incomes will continue to be from approximately 3% above to 17% below the poverty line. The reality is that CDEP is not a stepping stone to mainstream employment but a substitute for people who would normally find themselves outside the mainstream labour market (Hunter 2002b). The analysis of Nepabunna and Scotdesco also needs to take account of their lack of access to the services and infrastructure that people in urban areas and large rural towns enjoy. These include access to public transport, leisure venues and a range of shops.

A final comment on income relates to the capacity of these four settlements to generate additional income through the customary economy or through capital ventures such as tourism, fishing, agriculture or mining. We note in Chapter four that there is little opportunity for Nepabunna to explore alternative income generating schemes. The tourist market is already taken by Iga Warta, and Nepabunna's own explorations into bush foods are hampered by the lack of water. For this

venture to provide serious returns, a large-scale water harvesting system would need to be put in place. Both Yarilena and Scotdesco settlements do engage in small-scale commercial and agricultural enterprises and this money is used to maintain community services, including water infrastructure. As noted in the chapter on Yarilena, some of the profits from their fishing ventures have been spent on repairing leaks in the water pipes, and similarly at Scotdesco settlement, funds are being spent on repairs to the RO system.

Despite these trends, other research into Aboriginal and Torres Strait Islander poverty (Hunter and Gray 1999) indicate that there been an overall decline in the relative deprivation of Aboriginal and Torres Strait Islander Australians since 1986. This is attributed to the individualisation of welfare payments; that is, welfare payments are now paid to both the man and the women in a family unit. This shift in the organisation of welfare payments has had a significant impact on women between the ages of 25–34, promoting equity within the home. The negative side of this policy change is that there has been a slight rise in poverty rates for Aboriginal and Torres Strait Islander and other males. It should also be noted that this policy change has not resulted in an overall increase in income to Aboriginal groups, just a redistribution of welfare payments.

Amendments to the Municipal Services Act and its effect on settlements that are not individually billed for water

During the course of this research the federal government amended funding arrangements for municipal services to Aboriginal settlements. About 30 settlements are facing significant financial cutbacks and a shift in to mainstream services. Mainstreaming in this sense means that the specific needs of Aboriginal settlements will come under the jurisdiction of local councils. This includes garbage collection, keeping the neighbourhood tidy, and animal control and raises the question of how water, electricity, rental and health services will be managed. Davenport settlement will be affected by this new legislation.

In our work in Davenport we saw that the change to funding arrangements had clearly had a significant effect on the community. These changes pose particular difficulties in relation to water supply and use. The move to user pays through the National Water Initiative has similar effects. User pays conceives all parties (owner, provider, purchaser) as equal contractual agents. It is clear that Aboriginal settlements cannot be considered in this way, as supported by studies of the disadvantage of remote Aboriginal Australians.

Recommendations arising from the study

Recommendations for Nepabunna

- It is recommended that passive temperature control features be installed in existing houses and any new housing stock.
- Groundwater extraction rates should be investigated to ascertain the life of the bores.
- It is also recommended that DWLBC monitor the rate of potable water use as it is an integral component of the settlement's water supply.
- To prevent further utility stress, it is recommended that maximum subsidies for water services remain at Nepabunna. There should not be a move towards user pays for water services.
- Water provision to many remote Aboriginal settlements is not up to the water utility standards of metropolitan Adelaide (although in many cases it is of a better standard than outback towns). A review of the standards for water provision to remote settlements is needed.
- The community favours the expansion of rainwater harvesting systems because: it is a sustainable resource; it is a low maintenance technology; the storage, disinfection plant and reticulation system already exists; it can be used to lower the salinity of the non-potable supply and, if roof-based, supplement the potable supply. The possibility of expanding the rainwater harvesting system should be investigated.
- The community favours the installation of a new bore but understands the expense may be prohibitive. The cost of installing a new bore should be investigated.
- It is recommended that dual flush toilet fittings, and aerators on taps in the office block and work compound buildings be installed.
- While the community would be prepared to receive a water statement of use, the mechanics of collecting the data on water use could lead to tensions. It is not recommended that a water statement be issued.

Recommendations for Yarilena

- Additional rainwater tanks should be installed at each household to supplement their current rainwater supply and thereby reduce the cost of mains water to the community.
- The Aboriginal Health Council in Ceduna needs to be restocked with sampling equipment to enable them to resume periodic testing for bacterial contamination in rainwater tanks.

Recommendations for Scotdesco

- It is recommended that passive temperature control features be installed in existing housing and any new housing stock.
- The community would consider expansion of rainwater harvesting systems because: it is a sustainable resource; the costs of maintaining the desalination plant are unsustainable; it is a low maintenance technology; the storage and reticulation system already exists. It is recommended that the community visit existing ground-based rainwater harvesting systems to enable them to make informed decisions, as they currently feel that this technology 'is being imposed on them'.

Recommendations for Davenport

- It is recommended that passive temperature control features be installed in existing houses and any new housing stock.
- A water audit should be conducted in all settlement homes and buildings to identify where maintenance of water infrastructure is required and what the potential is for water efficient devices to be installed.
- Dual flush toilet fittings and aerators on taps should be fitted in the office block and work compound buildings.
- It is recommended that SA Water conduct an audit of all the water meters and subterranean water distribution infrastructure to determine the extent of water loss through leaking infrastructure, and to repair these where necessary.
- Legal issues governing access to Aboriginal Land by utility providers must be resolved before the federal government withdraws funding for the MSO.

Closing statement

One of the aims of the South Australian Strategic Plan (SASP) is 'Aboriginal wellbeing' which is in keeping with COAGs 'Overcoming Indigenous Disadvantage' policy. Under the SASP, a reporting framework exists to enable government 'to assess the impact of policy and service interventions on the lives of Aboriginal South Australians' (Department of Premier and Cabinet 2005). This study provides an assessment of the potential impact of increasing water costs in Nepabunna, Yarilena, Scotdesco and Davenport settlements. This study also provides a response to the recommendation that Aboriginal people be canvassed for their views on the issues arising from the NWI. The NWI requires Aboriginal engagement in their processes to properly address these issues.

The NWI legislation requires signatory states (South Australia) to provide water services that are economically viable and sustainable. The water resource options available to a number of Aboriginal settlements are not economically viable, and in parts there remain questions around the sustainability of supplies. The NWI is clear that in some instances the CSO will remain, provided there is transparency in its application. In the 2005 assessment of progress towards the NWI objectives, it is said that 'as long as the government [of South Australia] has a policy of statewide water pricing, there will be the need for a statewide CSO' (National Water Commission 2006, p.6.28). For many rural and remote towns and settlements in South Australia it is therefore vital that the CSO remain as part of South Australia's equity, social justice and regional policy. Furthermore, the NWI makes allowance for areas where services are uneconomical but need to be maintained to meet social and public health obligations. Given the levels of poverty in the settlements detailed in this study, additional subsidies will need to remain in place to ensure 'Aboriginal wellbeing'; the onus will be on policy makers and advisors to government to ensure this occurs. The responsibility for viability is not only up to advisors, government, service providers or policy makers, but is also a responsibility to be shared by the community through efficient water use. This study has shown that water use in all four settlements is mostly modest, with further water savings hindered by inappropriate housing design, or inappropriate water technology.

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Appendix 1: National framework of principles for delivering services to Indigenous Australians (National Water Initiative, Attachment B)

All jurisdictions are committed to achieving better outcomes for Indigenous Australians, improving the delivery of services, building greater opportunities and helping Indigenous families and individuals to become self-sufficient. To this end, and in delivering services to Indigenous people, COAG agreed to a national framework of principles for delivering services to Indigenous Australians.

Sharing responsibility

- Committing to cooperative approaches on policy and service delivery between agencies, at all levels of government and maintaining and strengthening government effort to address Indigenous disadvantage.
- Building partnerships with Indigenous communities and organisations based on shared responsibilities and mutual obligations.
- Committing to Indigenous participation at all levels and a willingness to engage with representatives, adopting flexible approaches and providing adequate resources to support capacity at the local and regional levels.
- Committing to cooperation between jurisdictions on native title, consistent with Commonwealth native title legislation.

Harnessing the mainstream

- Ensuring that Indigenous-specific and mainstream programs and services are complementary.
- Lifting the performance of programs and services by:
    - reducing bureaucratic red tape;
    - increasing flexibility of funding (mainstream and Indigenous-specific) wherever practicable;
    - demonstrating improved access for Indigenous people;
    - maintaining a focus on regional areas and local communities and outcomes; and
    - identifying and working together on priority issues.
- Supporting Indigenous communities to harness the engagement of corporate, non-government and philanthropic sectors.

Streamlining service delivery

- Delivering services and programmes that are appropriate, coordinated, flexible and avoid duplication:
    - including fostering opportunities for Indigenous delivered services.
- Addressing jurisdictional overlap and rationalising government interaction with Indigenous communities:
    - negotiating bilateral agreements that provide for one level of government having primary responsibility for particular service delivery, or where jurisdictions continue to have overlapping responsibilities, that services would be delivered in accordance with an agreed coherent approach.

- Maximising the effectiveness of action at the local and regional level through whole-of-government(s) responses.
- Recognising the need for services to take account of local circumstances and be informed by appropriate consultations and negotiations with local representatives.

Establishing transparency and accountability

- Strengthening the accountability of governments for the effectiveness of their programs and services through regular performance review, evaluation and reporting.
- Ensuring the accountability of organisations for the government funds that they administer on behalf of Indigenous people.
- Tasking the Productivity Commission to continue to measure the effect of the COAG commitment through the jointly-agreed set of indicators.

Developing a learning framework

- Sharing information and experience about what is working and what is not.
- Striving for best practice in the delivery of services to Indigenous people, families and communities.

Focussing on priority areas

- Tackling agreed priority issues, including those identified in the Overcoming Indigenous Disadvantage Report:

  - early childhood development and growth; early school engagement and performance, positive childhood and transition to adulthood; substance use and misuse; functional and resilient families and communities; effective environmental health systems; and, economic participation and development.

Within this National Framework appropriate consultation and delivery arrangements will be agreed between the Commonwealth and individual States and Territories.

Appendix 2: Excerpts (clauses) from The National Water Initiative

Best practice water pricing and institutional arrangements: outcomes

64. The Parties agree to implement water pricing and institutional arrangements which:

i) promote economically efficient and sustainable use of:

a) water resources;

b) water infrastructure assets; and

c) government resources devoted to the management of water;

ii) ensure sufficient revenue streams to allow efficient delivery of the required services;

iii) facilitate the efficient functioning of water markets, including inter-jurisdictional water markets, and in both rural and urban settings;

iv) give effect to the principles of user-pays and achieve pricing transparency in respect of water storage and delivery in irrigation systems and cost recovery for water planning and management;

v) avoid perverse or unintended pricing outcomes; and

vi) provide appropriate mechanisms for the release of unallocated water.

Best practice water pricing and institutional arrangements: actions

Water storage and delivery pricing

65. In accordance with NCP commitments, the States and Territories agree to bring into effect pricing policies for water storage and delivery in rural and urban systems that facilitate efficient water use and trade in water entitlements, including through the use of:

i) consumption based pricing;

ii) full cost recovery for water services to ensure business viability and avoid monopoly rents, including recovery of environmental externalities, where feasible and practical; and

iii) consistency in pricing policies across sectors and jurisdictions where entitlements are able to be traded.

66. In particular, States and Territories agree to the following pricing actions:

Rural and regional

v) full cost recovery for all rural surface and groundwater based systems, recognising that there will be some small community services that will never be economically viable but need to be maintained to meet social and public health obligations:

a) achievement of lower bound pricing for all rural systems in line with existing NCP commitments;

b) continued movement towards upper bound pricing for all rural systems, where practicable; and

c) where full cost recovery is unlikely to be achieved in the long term and a Community Service Obligation (CSO) is deemed necessary, the size of the subsidy is to be reported publicly and, where practicable, jurisdictions to consider alternative management arrangements aimed at removing the need for an ongoing CSO.

Cost recovery for planning and management

67. The States and Territories agree to bring into effect consistent approaches to pricing and attributing costs of water planning and management by 2006, involving:

i) the identification of all costs associated with water planning and management, including the costs of underpinning water markets such as the provision of registers, accounting and measurement frameworks and performance monitoring and benchmarking;

ii) the identification of the proportion of costs that can be attributed to water access entitlement holders consistent with the principles below:

a) charges exclude activities undertaken for the Government (such as policy development, and Ministerial or Parliamentary services); and

b) charges are linked as closely as possible to the costs of activities or products.

68. The States and Territories agree to report publicly on cost recovery for water planning and management as part of annual reporting requirements, including:

i) the total cost of water planning and management; and

ii) the proportion of the total cost of water planning and management attributed to water access entitlement holders and the basis upon which this proportion is determined.

Investment in new or refurbished infrastructure

69. The Parties agree to ensure that proposals for investment in new or refurbished water infrastructure continue to be assessed as economically viable and ecologically sustainable prior to the investment occurring (noting paragraph 66 (v)).

Release of unallocated water

70. Release of unallocated water will be a matter for States and Territories to determine. Any release of unallocated water should be managed in the context of encouraging the sustainable and efficient use of scarce water resources.

71. If a release is justified, generally, it should occur only where alternative ways of meeting water demands, such as through water trading, making use of the unused parts of existing entitlements or by increasing water use efficiency, have been fully explored.

72. To the extent practicable, releases should occur through market-based mechanisms.

Environmental externalities

73. The States and Territories agree to:

i) continue to manage environmental externalities through a range of regulatory measures (such as through setting extraction limits in water management plans and by specifying the conditions for the use of water in water use licences);

ii) continue to examine the feasibility of using market based mechanisms such as pricing to account for positive and negative environmental externalities associated with water use; and

iii) implement pricing that includes externalities where found to be feasible.

Institutional reform

74. The Parties agree that as far as possible, the roles of water resource management, standard setting and regulatory enforcement and service provision continue to be separated institutionally.

Benchmarking efficient performance

75. The States and Territories will be required to report independently, publicly, and on an annual basis, benchmarking of pricing and service quality for metropolitan, non-metropolitan and rural water delivery agencies. Such reports will be made on the basis of a nationally consistent framework to be developed by the Parties by 2005, taking account of existing information collection including:

i) the major metropolitan inter-agency performance and benchmarking system managed by the Water Services Association of Australia;

ii) the non-major metropolitan inter-agency performance and benchmarking system managed by the Australian Water Association ; and

iii) the irrigation industry performance monitoring and benchmarking system, currently being managed by the Australian National Committee on Irrigation and Drainage.

76. Costs of operating the above performance and benchmarking systems are to be met by jurisdictions through recovery of water management costs.

Independent pricing regulator

77. The Parties agree to use independent bodies to:

i) set or review prices, or price setting processes, for water storage and delivery by government water service providers, on a case-by-case basis, consistent with the principles in paragraphs 65 to 68 above; and

ii) publicly review and report on pricing in government and private water service providers to ensure that the principles in paragraphs 65 to 68 above are met.

Water resource accounting: outcome

80. The Parties agree that the outcome of water resource accounting is to ensure that adequate measurement, monitoring and reporting systems are in place in all jurisdictions, to support public and investor confidence in the amount of water being traded, extracted for consumptive use, and recovered and managed for *environmental and other public benefit outcomes*.

Water resource accounting: actions

Benchmarking of accounting systems

81. Recognising that a national framework for comparison of water accounting systems can encourage continuous improvement leading to adoption of best practice, the Parties agree to benchmark jurisdictional water accounting systems on a national scale by June 2005, including:

i) State based water entitlement registering systems;

ii) water service provider water accounting systems;

iii) water service provider water use/delivery efficiency; and

iv) jurisdictional/system water and related data bases.

Consolidated water accounts

82. Recognising that robust water accounting will protect the integrity of the access entitlement system, the Parties agree to develop and implement by 2006:

i) accounting system standards, particularly where jurisdictions share the resources of river systems and where water markets are operating;

ii) standardised reporting formats to enable ready comparison of water use, compliance against entitlements and trading information;

iii) water resource accounts that can be reconciled annually and aggregated to produce a national water balance, including:

a) a water balance covering all significant water use, for all managed water resource systems;

b) systems to integrate the accounting of groundwater and surface water use where close interaction between groundwater aquifers and streamflow exist; and

c) consideration of land use change, climate change and other externalities as elements of the water balance.

83. States and Territories agree to identify by end 2005 situations where close interaction between groundwater aquifers and streamflow exist and implement by 2008 systems to integrate the accounting of groundwater and surface water use.

Environmental water accounting

84. The Parties agree that principles for environmental water accounting will be developed and applied in the context of consolidated water accounts in paragraph 82.

85. The Parties further agree to develop by mid 2005 and apply by mid 2006:

i) a compatible register of new and existing environmental water (consistent with paragraph 35) showing all relevant details of source, location, volume, security, use, environmental outcomes sought and type; and

ii) annual reporting arrangements to include reporting on the environmental water rules, whether or not they were activated in a particular year, the extent to which rules were implemented and the overall effectiveness of the use of resources in the context of the environmental and other public benefit outcomes sought and achieved.

Metering and measuring

87. The Parties agree that generally metering should be undertaken on a consistent basis in the following circumstances:

i) for categories of entitlements identified in a water planning process as requiring metering;
ii) where water access entitlements are traded;
iii) in an area where there are disputes over the sharing of available water;
iv) where new entitlements are issued; or
v) where there is a community demand.

88. Recognising that information available from metering needs to be practical, credible and reliable, the Parties agree to develop by 2006 and apply by 2007:

i) a national meter specification;

ii) national meter standards specifying the installation of meters in conjunction with the meter specification; and

iii) national standards for ancillary data collection systems associated with meters.

Reporting

89. The Parties agree to develop by mid 2005 and apply national guidelines by 2007 covering the application, scale, detail and frequency for open reporting addressing:

i) metered water use and associated compliance and enforcement actions;
ii) trade outcomes;
iii) environmental water releases and management actions; and
iv) availability of water access entitlements against the rules for availability and use.

Appendix 3: Aboriginal reference group

Members

Alwin Chong	Aboriginal Health Council
Sharon Meagher	Aboriginal Affairs and Reconciliation Division, Department of Premier and Cabinet
Alwyn McKenzie	Aboriginal Affairs and Reconciliation Division, Department of Premier and Cabinet
Jason Downes	Primary Industries Research South Australia
John Chester	Aboriginal Lands Trust
David Singh	Aboriginal Lands Trust

Meeting dates

October 2005

December 2005

February 2006

June 2006

November 2006

Terms of reference for Aboriginal reference group

Project title: Water service delivery and State and Commonwealth water reform objectives – a response from Aboriginal communities in South Australia.

This research project is funded by the Aboriginal Affairs and Reconciliation Division (AARD), Department of Premier and Cabinet, The Commonwealth Department of Family, Community Services and Indigenous Affairs (FACSIA), United Water, Flinders University, Desert Knowledge CRC and CRC Aboriginal Health. This project follows on from a previous study undertaken in SA of the 18 communities that are part of the bilateral essential services agreement between the SA State government and the former ATSIC. While the previous research project focussed on collecting data on the water supply in all 18 of the communities, the current project aims to identify economically feasible and environmentally sustainable strategies to reduce water costs to Aboriginal households in discrete communities. The research team aims to include one community where residents are already paying for their water, one where residents are not paying for water and one homeland not under the former bilateral agreement. This should provide an idea of the range of factors that need to be considered where current arrangements for water service provision differ, with the aim of providing some suggestions of where uniformity of arrangements might be achieved.

Aboriginal reference group: Role

Provide advice and guidance to the research team on cultural, social and political issues arising from conducting the research.

Act as an information source, exchange and dissemination group in relation to the project.

Identify good research practice in coordination and communication strategies between the research team and the various communities and individuals involved.

Engender support for the research project**:** Outwards through the Nunga, Nulla, Yura and Anangu Communities;

Upwards through key personnel within the various departments and agencies engaged or linked to the project; Co-opt other advice as necessary.

Aboriginal reference group: Reporting arrangements

The Committee will be chaired by Alwyn McKenzie.

The Committee will make a quarterly report to the Aboriginal Health Council SA.

Aboriginal Reference Group members' rights to share in publications. Members of the Indigenous reference group have a right to share in research publications similar to the guidelines set down for other members of the research team. These guidelines follow those set out by the British Medical Journal and are as follows:

Individuals seeking to be part of the authorship should make a substantial contribution to:

Conception and design, or analysis and interpretation of data;

Drafting the article or revising it critically for important intellectual content;

Final approval of the final report to be published.

First authorship credit is allocated to the person with whom the idea for the paper originated. All other names follow in alphabetical order, except where there is clear evidence of considerable contribution to the development of the paper.

Appendix 4: Fact sheets

Fact sheet 1: Continued exploration for another bore, although this may be some distance from Nepabunna

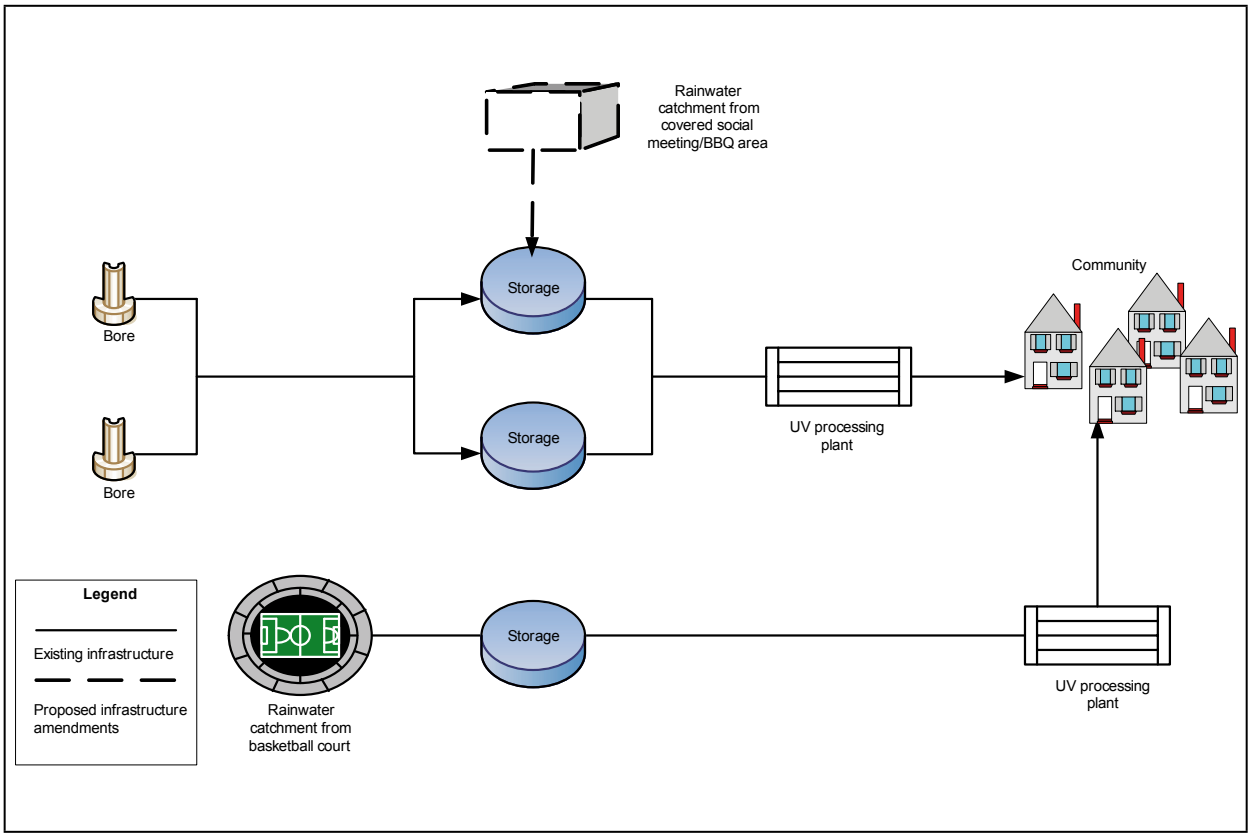

Figure 1: Schematic layout of water supply infrastructure at Nepabunna (adapted from Morgan et al. 2003) with a possible additional bore supply

If a new supply of groundwater was found some distance from Nepabunna it is possible that a bore could be installed and a pipeline constructed to transport the water to Nepabunna.

Currently the bore water is expected to only last another 10 years. Groundwater in the region is poor in both quality and quantity. If a new groundwater source were found it would probably only extend the supply a few more years.

The water would probably be of the same type of salinity as the existing groundwater at Nepabunna, but it would at least ensure the supply lasts a few more years.

If a new groundwater supply were found the water supply would probably have to be piped to and shared with Iga Warta.

New costs to DAARE

Initial set-up costs:

- Installation of bore
- Test pumping
- Pump
- Piping to community

Ongoing costs:

- Pumping to withdraw groundwater and pump it to the community
- Maintenance of equipment and testing

Existing costs:

For DAARE to supply Nepabunna with water (groundwater pumping, piping and storage, UV treatment, pumping to buildings) excluding maintenance expenses it costs $5,040 per fortnight.

If a rainwater catchment system were built would each household be willing to contribute:

□ $5 per fortnight towards the costs (i.e. less than 2% of AARD's basic costs)

□some financial contribution towards the costs, but less than $5, perhaps $……per fortnight

□some financial contribution towards the costs, more than $5, perhaps $……per fortnight

□ nothing towards the costs, because……..

Fact sheet 2: Greater use of rainwater

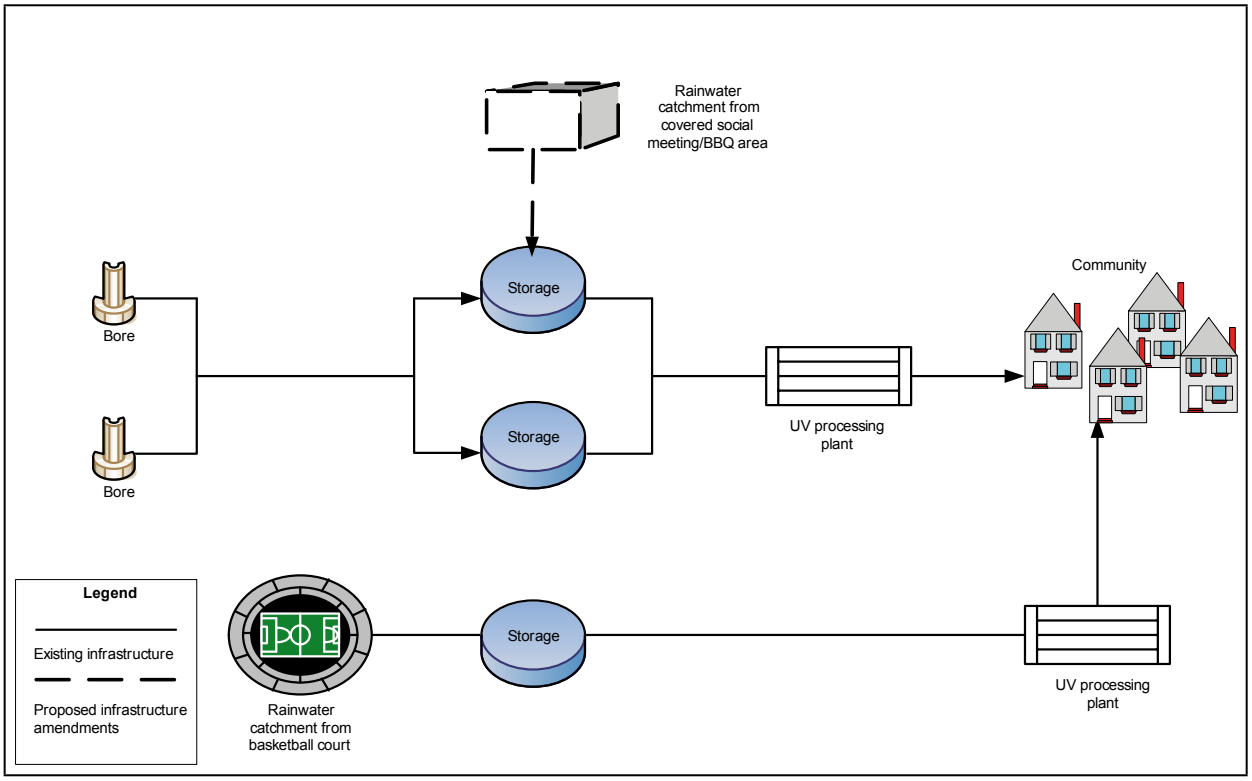

Figure 1: Schematic layout of water supply infrastructure at Nepabunna (adapted from Morgan et al. 2003) with a possible additional rainwater harvesting scheme

Part 1: Reduce the salinity of the bore water by mixing with rainwater, and extend the life of the groundwater and the life of household taps and appliances

A new rainwater catchment system could be built over a new social meeting area up on the hill where the view is lovely, with BBQ areas and a place for a central bonfire around which people can gather and socialise.

The rainwater harvested in this way (is the same as how the basketball catchment works) could be piped into the bore storage tanks.

Mixing the rainwater with the salty bore water will reduce the hardness, salinity and iron content of the bore water. This would mean that the water piped to each house would be softer so taps, evaporative coolers and boilers will not corrode as quickly.

This option would also mean that less water would be taken from the bores, and this would mean that the bores would last longer. Without this option the bore water is expected to only last another 10 years.

Part 2: Install rainwater tanks at the community centre and workshed and plumb the rainwater into the toilets

Install a 27,000 litre rainwater tank at the community office building and plumb it into the toilet flushing system. The community centre receives a lot of visitors and much water is wasted in toilet flushing. Install dual flush toilets in the community centre.

Install a 27,000 litre rainwater tank at the workshop shed and plumb it into the toilet flushing system. Install dual flush toilets.

This option would also mean that less water would be taken from the bores, and this would mean that the bores would last longer.

Costs to DAARE

New costs:

- Pump costs = $2,300
- Plumbing installation including non-return valves = $4,000
- Construction of social meeting area, first-flush devices, debris screen, pipes to storage tanks.

Existing costs:

For DAARE to supply Nepabunna with water (groundwater pumping, piping and storage, UV treatment, pumping to buildings) excluding maintenance expenses it costs $5,040 per fortnight.

If a rainwater catchment system were built would each household be willing to contribute:

□$5 per fortnight towards the maintenance costs (i.e. less than 2% of AARD's basic costs)

□some financial contribution towards the basic and maintenance costs, but less than $5 perhaps $…….per fortnight

□some financial contribution towards the basic and maintenance costs, more than $5 perhaps $…….per fortnight

□nothing towards the maintenance, because……..

Fact sheet 3: Water efficiencies in the house

A

Photo A above: The full flush on a water-efficient toilet can use 4.5 litres per flush compared to 11 litres in some toilets.

On average in Australia about 19% of all water used is for toilet flushing. If one assumes Nepabunna also uses 19% of all water use for toilet flushing that means around 13,230 litres per day is flushed down the toilet – by installing dual flush toilets throughout Nepabunna can save half that amount.

Cost of dual flush system $30.

B

Photo B above: Installing AAA showerheads offers both spray and massage settings and reduces household water consumption by 20% (or for Nepabunna would save over 70 litres per person per day). It will also result in a lower energy bill as less energy is used (because less hot water is used).

Cost of AAA showerhead $15.

C

Photo C: Aerator in kitchen tap reduces water use.

Cost of kitchen tap aerator $115.

Similar examples from elsewhere in Australia:

Half of all the water used in Sydney is what people use inside their houses. It is believed that by putting water saving devices on the taps, showers and toilets inside the houses will save a small amount of water, around 12%. In Sydney 500,000 houses will be fitted with water saving devices (such as showerheads, taps, toilets) by July 2007, as part of the New South Wales Government's Metropolitan Water Plan.

In Sydney people are being offered a free 'Do it yourself water saving kit'. The kit, is worth $20, but is given to people for free. It contains water saving devices for household taps that can be easily installed by the householder, with a resultant saving of around $50 per year on water and energy bills.

Options for Nepabunna:

Given the hardness of the water in Nepabunna installing these water-saving devices should go hand in hand with shandying the bore water with rainwater to extend the life of the water-saving fittings.

Currently the bore water in Nepabunna will only last another 10 years, if you use water-saving showerheads and dual flush toilets the water saved just from that in one year will extend the life of one bore between 4 to 5 months.

If water-efficient fittings were installed into your home and the community buildings and all the plumbing services costs were covered (by an industry partner) would you be willing to contribute:

□ a once-off payment of half of the cost of just the equipment i.e. $20 per household

□ a once-off payment of quarter of the cost of the equipment i.e. $10 per household

□ some financial contribution towards the costs, but less than $10, perhaps $……in total

□ nothing towards the costs, because……..

Fact sheet 4: New water statement option

As one of the options to try and reduce water use in all urban parts of Australia, the new National Water Initiative legislation (Clause 66(iv) requires the 'development of national guidelines for customers' water accounts that provide information on their water use relative to equivalent households in the community by 2006'. In the proposed accounts system, in Brisbane for example the customer is shown their water use, their use in comparison to the same period the previous year, the local suburb average and the metropolitan average for the same period (see Figure 1). In an example from Yarra Valley Water the account gives the household water consumption and provides a simple graph showing the 'typical' and 'efficient' water use for the number of people and the size of the house (Figure 2).

While this clause in the legislation only applies to urban areas how do you feel about a similar process occurring in Nepabunna?

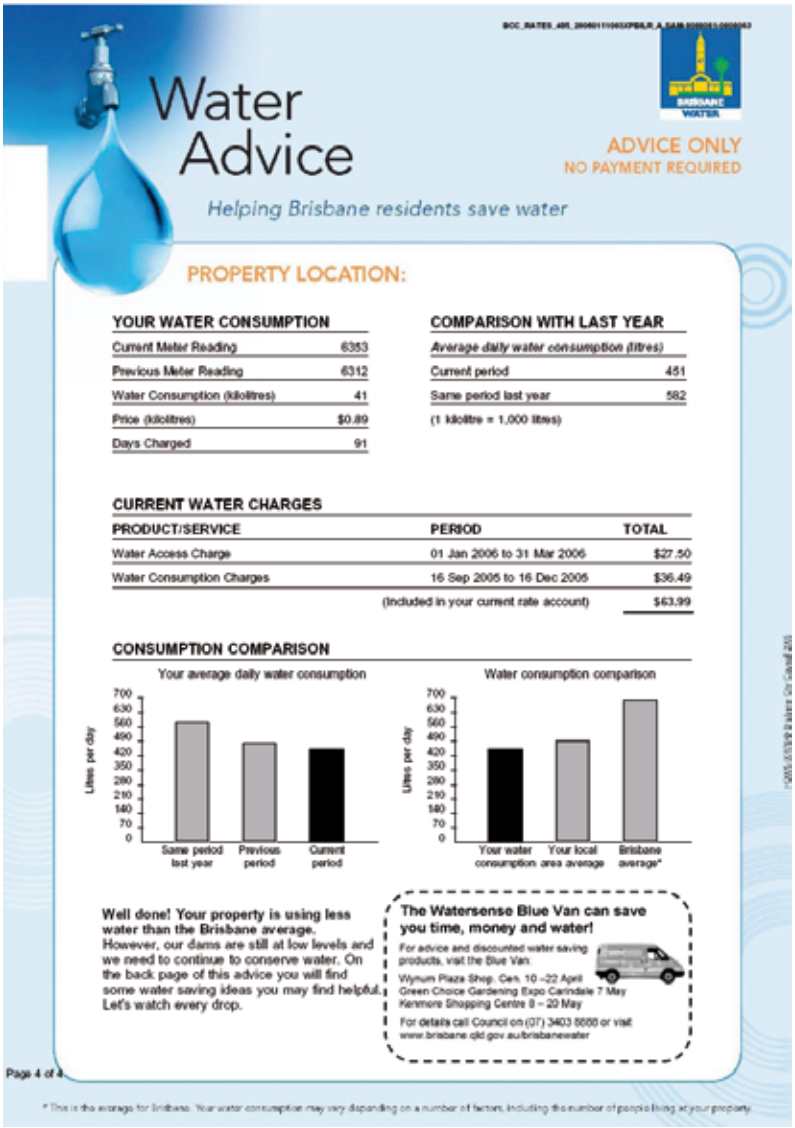

Figure 1: Brisbane water account showing comparative water use as outlined in the proposed 'National guidelines for metropolitan customers' water accounts'

Source: Environment Protection and Heritage Council 2006

Yarra Valley Water Account

Fold-out, tear-off Flap

Front of Flap

Panel with comparative data

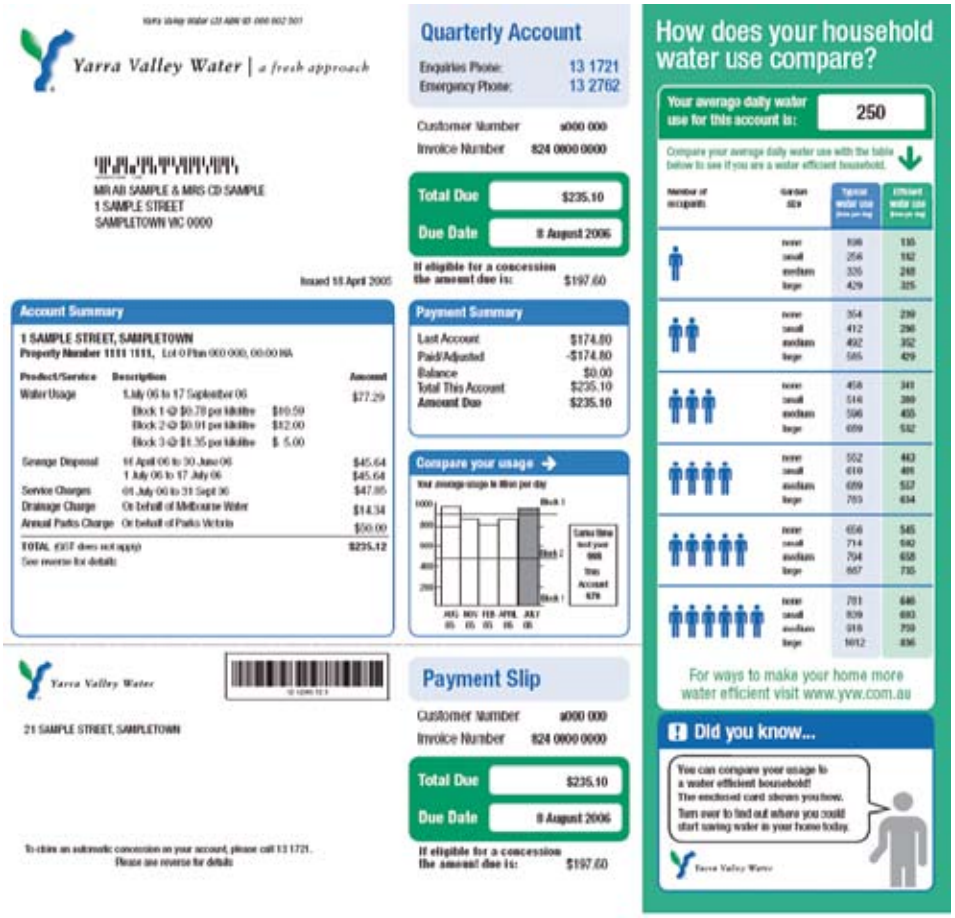

Figure 2: Yarra Valley Water account showing comparative water use as outlined in the proposed 'National guidelines for metropolitan customers' water accounts'

Source: Environment Protection and Heritage Council 2006

What do you think of the new COMPARATIVE water account?

☐ I would like to know how my water use compares to the average use in Nepabunna and compared to use in Copley

☐ I would NOT like the bill which shows the average use by others, because ……

☐ I think this bill system will help reduce water wastage

☐ I DO NOT think this bill system will help reduce water wastage, because ……

Appendix 5: Flinders University ethics documentation given to participants

LETTER OF INTRODUCTION

GPO Box 2100

Adelaide 5001 Australia

Telephone: (+61 8) 8201 5608

Facsimile: (+61 8) 8201 3646

Email: Eileen.Willis@flinders.edu.au

Meryl.Pearce@flinders.edu.au

Dear Name,

We are lecturers at Flinders University. Eileen is in the School of Medicine at Flinders University and Meryl is in the School of Geography, Population and Environmental Management.

We are undertaking research leading to the production of a report on the subject of the impact of the National Water Initiative on Aboriginal communities in South Australia. The project is funded by the Department for Aboriginal Affairs and Reconciliation (DAARE) and the Department of Family and Community Services (FACS).

The project involves working with three community councils on ways to reduce water consumption and water costs [specified for those communities that currently pay for water]. The project aims to provide a response from Aboriginal communities to Government concerning the implications of new legislation for Aboriginal communities. In June 2004, in addition to signing the National Water Initiative (NWI) Agreement, the Council of Australian Governments (CoAG) agreed to a *National Framework of Principles for Government Service Delivery to Indigenous Australians* (CoAG, 2004:Attachment B). These principles are based around sharing responsibility, harnessing the mainstream, streamlining service delivery, establishing transparency and accountability, developing a learning framework and focusing on priority areas. According to the Council of Australian Governments (CoAG, 2004:3), the principles outline a commitment "to Indigenous participation at all levels and a willingness to engage with representatives, adopting flexible approaches and providing adequate resources to support capacity at the local and regional levels". The National Water Initiative also includes the principles of economical viability and environmental sustainability for all users of water resources – this means water costs need to be reduced and water use efficiency improved.

We would be most grateful if the community council at [xxxxxxx community] would be prepared to work with us on this project. It is an action research project which means we would like to visit the community three times in the next 18 months and talk to the council and other interested people. Our aim is to work with you to produce a report that would go to DAARE outlining the appropriate changes to be made to community houses that would reduce water consumption and water costs. The second aspect of the project is to record what communities are paying for water and what strategies they have in place for meeting these costs.

Only members of the research team will have access to transcripts. Any information provided will be treated in the strictest confidence, the names of individuals will not be revealed outside of the research team and the confidentiality of the material will be respected and maintained. None of the participants would be individually identifiable in the final report or other publications. The community would of course, be entirely free to discontinue its participation at any time or to decline to answer particular questions.

We would talk to community members during our visits to find out what they think is the best approach for sustainable technology and cost saving strategies. On our final visit we would bring back a written copy of the draft report for the community to read and make any changes.

Any queries you may have concerning this project should be directed to me at the address given above or by telephone on 8201-3110, fax 8270-2250 or e-mail Meryl.Pearce@flinders.edu.au

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee. The Secretary of this Committee can be contacted on 8201-5962, fax 8201-2035, e-mail Sandy.Huxtable@flinders.edu.au. The research has also been approved by the Aboriginal Health Research Ethics Committee. The Secretary of this Committee can be contacted through Mr Alwin Chong on 8132-6730.

Thank you for your attention and assistance.

Yours sincerely

Meryl Pearce
Senior Lecturer
School of Geography, Population
and Environmental Management

Eileen Willis
Senior Lecturer
School of Medicine
Department of Palliative and Extended Services

CONSENT FORM FOR FOCUS GROUP

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Meryl.Pearce@flinders.edu.au

CONSENT FORM FOR FOCUS GROUP

I .....

being over the age of 18 years hereby consent to participate as requested in the participative action research for the National Water Initiative Response project.

1. I have read the information provided.

Details of procedures and any risks have been explained to my satisfaction.

3. I agree to my information and participation being written down.

4. I am aware that I should retain a copy of the Information Sheet and Consent Form for future reference.

5. I understand that:

I may not directly benefit from taking part in this research.

I am free to withdraw from the project at any time and am free to decline to answer particular questions.

While the information gained in this study will be published as explained, I will not be identified, and individual information will remain confidential.

I may ask that the recording/observation be stopped at any time, and that I may withdraw at any time from the session or the research without disadvantage.

6. I have had the opportunity to discuss taking part in this research with a family member or friend.

Participant's signature……Date……...

I certify that I have explained the study to the volunteer and consider that she/he understands what is involved and freely consents to participation.

Researcher's signature……..Date…….

7. I, the participant whose signature appears below, have read a transcript of my participation and agree to its use by the researcher as explained.

Participant's signature……Date……...

8. I, the participant whose signature appears below, have read the researcher's report and agree to the publication of my information as reported.

Participant's signature……Date……...

Appendix 6: Nepabunna weekly menu

Breakfast	Bacon and eggs Or baked beans or sausages Or Weetbix or porridge Or cheese and meat Toast and margarine Tea or Milo, sugar
Lunch	Sandwich – leftovers, bread Cheese, tomato, lettuce, cold meats Tea
Dinner	Eggs/chips Kangaroo meat, damper, rissoles Roast and vegetables (potatoes, carrots, pumpkin, cabbage, cauliflower, frozen peas) Tinned spaghetti, tinned baked beans, spaghetti bolognaise, mince
Weekend	Friday and Sunday night will be leftovers (whatever is in the fridge)
Fruit and vegetables	Apples, oranges, pears bought to equivalent of 3 pieces per person per week Vegetables 3 times per week

Appendix 7: Nepabunna – Survey of food, health consumables and health hardware costs

Shelf items per fortnight	Copley $	Adelaide $	Leigh Creek $	AGHE per fortnight for 2 adults, 1 child	Actual amounts bought	Total for Adelaide $	Total for Nepabunna $
Weetbix 1kg		4.39	5.09	1	1kg	4.39	5.09
Porridge oats 500g Foodland		1.22	1.19	3	3	3.66	3.57
Bread wholemeal/ white	3.40	1.79	2.79	11	11	19.69	30.69
Spaghetti B&G tin		0.89	0.92	1	4	3.56	3.68
Baked beans B&G		0.69	B&G 1.61		4	2.76	6.44
Flour B&G SR 2kg		1.79	2.30	1 kg	3 kg	3.45	2.69
Marg. 500g Meadow Lea		2.84	Flora 2.76	0.25	0.5	2.84	2.76
Cake mix WhiteWings		4.12	Choc 4.59	1	1	4.59	4.12
Custard powder	2.35	1.72				1.72	2.35
Milk powder Sunshine 400g		4.31	4.91			4.31	4.91
Canola/sunflower oil 2L	5.69	B&G 5.94		0.25	1 litre	2.97	2.85
Cordial Cottees 2L		3.95	2.99	0.25	1 litre	1.95	1.50
Teabags Lipton 50	4.10	2.36	3.43	na	2 pack	4.72	6.86
Coffee Nescafe 100g		4.99	100g 6.27	na	1	4.99	6.27
Honey 500g (IGA)		1kg 4.49	5.56	0.5	1	2.24	5.56
Ice cream Peters 2L		4.29	4.88	0.5	2 litre	4.29	4.88
Sugar 1 kg	1.67	CSR 1.23		0.5		0.62	0.83
Pasta San Remo 500g	2.35	1.89	2.12	2	2	3.78	4.24
Spaghetti tin		0.89	0.92		4	3.56	3.68
Milo 450 g	6.20	4.99	750g 8.65		1	4.99	5.10
Milo 450 g			450g 5.10				
Tomato sauce B&G 600 ml	2.57	1.59	2.02		1	1.59	2.02
Soup Heinz 420g		420g 1.58					
Soup Heinz 500g	3.50	500g 1.88	2.08			1.88	2.08
Soup mix Continental 375g		1.34	1.93			1.34	1.93
Total						89.89	114.10

Fruit and vegetables per fortnight	Copley $	Adelaide $	Leigh Creek $	AGHE per fortnight for 2 adults and 1 child	Actual amounts bought	Total for Adelaide $	Total for Nepabunna $
Tomatoes 1kg		3.99	4.29	750g	500g	1.98	2.15
Potatoes 5kg		6.99	6.99	5 kg	10 kg	14.00	14.00
Lettuce		2.49	1.99	1 whole	1	2.49	1.99
Carrots 1Kg		1.49	1.49	1 kg	1kg	1.49	1.49
Cauliflower		4.99	Cauli tray 4.69	Additional		4.99	4.69
Onion 1kg		2.79	1.99	1kg	1kg	2.79	1.99
Apples 2kg Royal Gala		4.99	4.49 - 4.99	4kg	2	4.99	4.99
Pineapple 440g tinned		1.77	1.79	220 g	1	1.77	1.79
Frozen peas Birds Eye 500g		1.49	1.49	500g	500g	1.49	1.49
Pumpkin 2kg		2.58	2.49	1.3kg	1kg	1.29	1.24
Oranges 3 kg		3.99	2.5kg 3.99	1.75 kg	3kg	3.99	4.78
Total						**$41.27**	**$40.60**

Meat and dairy per fortnight	Copley $	Adelaide $	Leigh Creek $	AGHE per fortnight for 2 adults and 1 child	Actual amounts bought	Total for Adelaide $	Total for Nepabunna $
Milk 3L x 5	2L 3.85	3L 3.75	2L 3.11	3	15 L	18.75	23.40
Cheese Coon tasty 500g		5.99	4.33	250g	500g	5.99	4.33
Mince 1kg		quality 7.99	11.99	750 g	1kg	7.99	11.99
Sausages 1kg		4.48	3.37	250g	1kg	4.48	3.37
Bacon 250g		2.26	4.17	250g	500g	4.52	8.34
Chicken wings/drumstick 1 kg		7.70	7.75	500 g	1kg	7.70	7.75
Eggs 1 dozen	3.70	2.29		0.5	2	4.58	7.40
Side of lamb/beef or roast		10.50/kg	10.99 kg		6 kg	63.00	65.94
Total						**$117.01**	**$132.52**

Summary of food costs	Adelaide	Nepabunna
Shelf items	89.89	114.10
Fruit and vegetables	41.27	40.60
Meat and dairy products	117.01	132.52
Total food cost per fortnight	$248.17	$287.22
Total food cost per week	$124.09	$143.61

Health consumables per fortnight	Cost in Adelaide $	Cost at Copley $	Cost at Leigh Creek $	Total for Adelaide $	Total for Nepabunna $
Soap Country Life 5pk	2.69	Colgate 4.00 - 4.15		2.69	4.15
Shampoo Pantene (due to hard water)	7.99		Pantene 9.82	7.99	9.82
Conditioner Pantene	7.99		9.82	7.99	9.82
Toothpaste Mcleans 120g	2.25	Colgate 3.74		2.25	3.74
Toilet paper Sorbent 8 pk	4.99 x 2		5.28 x 2	9.98	10.56
Tissues Sorbent	2.42	Kleenex 3.60		2.42	3.60
Panadol 24	2.89		3.40	2.89	3.40
Pine O' Kleen	2x 3.67		2x Harpic 3.61	7.34	7.22
Total				**$43.55**	**$52.31**

Health consumables per month	Cost in Adelaide	Cost at Copley	Cost at Leigh Creek	Total for Adelaide	Total for Nepabunna
Bandaid 100s	6.98		50 for 4.99	6.98	9.98
Rubber gloves B&G	0.59		2.76	0.59	2.76
Laundry detergent B&G 1kg	2.15		4 kg B&G 5.81	2.15	1.45
Dish mop	1.33		1.95	1.33	1.95
Dishwash detergent Spree 1 lt	2.59		3.39	2.59	3.39
Stayfree reg. pads 20	4.48	2.48		4.48	2.48
Deodorant Lynx mens	5.19		6.25	5.19	6.25
Razors Bic 5pk	1.99	5 for 2.29		1.99	2.29
Shaving foam 250g B&G /IGA	1.56	1.65		1.56	1.65
Mortein 350g	10.55		10.55	10.55	10.55
Cotton wool balls 150	1.33		1.30	1.33	1.30
Gladwrap 30 m	2.49		2.84	2.49	2.84
Gladbags 10	2.98		4.20	2.98	4.20
Pegs	2.59		1.27	2.59	1.27
White King 750 ml	1.91		2.45	1.91	2.45
Toothbrush	TEK 2.17		4.38	2.17	4.38
Total cost per month				$50.88	$59.19
Total cost per fortnight				$25.44	$29.60

Summary of health consumables costs	Adelaide $	Nepabunna $
Health consumables - fortnightly items	43.55	52.31
Health consumables - monthly items	25.44	29.60
Total health consumables cost per fortnight	$68.99	$81.91
Total health consumables cost per week	$34.50	$40.96

Health hardware item	Retail Price	Terms	Cost per year
Jug Sunbeam cordless filter 1.8 L	34.95	4 yrs	8.75
Frypan Sunbeam Electric	54.95	4 yrs	13.73
Toaster Sunbeam basic	29.95	4 yrs	7.49
Iron Sunbeam	50.00	4 yrs	12.50
Microwave LG 32 litre	199.00	4 yrs	49.75
TV LG 66 cm pure flat widescreen	699.00	8 yrs	87.38
Fridge Westinghouse 202 litre frost-free	499.00	8 yrs	62.38
Pillow polyester	11.95	1/yr	11.95
Bath towel Elements	16.95	1/yr	16.95
Sheet set (fitted) Paddington Lane	59.95	1/ 2 yr	30.00
Blanket Elements acrylic	69.95	1/ 2 yr	35.00
Tea towels	2.00	3	6.00
Mop Oates	5.41	2	10.82
Broom Vileda	9.30		9.30
Crockery	40.00	4 yrs	10.00
Pots and pans	100.00	6 yrs	16.00
Glassware	20.00	2 yrs	10.00
Total cost per year for health hardware			**$398.00**
Total cost per week for health hardware			**$7.65**

Appendix 8: Comparison of food and health consumables costs between Nepabunna and Adelaide

Food costs

Total cost for consumable food and non-alcoholic beverages for Nepabunna for 2 adults and one child under 15: $287.22 per fortnight, $143.61 per week.

In calculating the cost of food per week for Nepabunna we have added an additional $15 for school lunches and trips to town bringing the amount to $158.61.

Total cost for Adelaide for 2 adults and one child under 15: $248.17 per fortnight, $124.09 per week.

Based on these figures, Nepabunna residents pay 15.7% more for food than residents in the Adelaide metropolitan area.

Percentage of income spent on food by the hypothetical family at Nepabunna: 26.0% (this does not include take-away food or school lunches)

Health consumables

The health consumables cost per week for Nepabunna residents is $40.96 versus Adelaide metropolitan area costs of $34.50.

Percentage of income spent on health consumables by the hypothetical family at Nepabunna: 7.4%

Appendix 9: Nepabunna water use during two intensive periods in 2005 and 2006

Summary of household water use in Nepabunna						Summary of household water use in Nepabunna				
October/November 2005						February/March 2006				
House	Usual no. of people	Average/ occasional visitors	Average daily no. of people (inc. visitors and absences)	*Daily water use, litres per person	Comments	Usual no. of people	Average/ occasional visitors	Average daily no. of people (inc. visitors and absences)	*Daily water use, litres per person	Comments
1	2 to 3	2 or 4	3.2	735 l/p/d	Frequent visitors	-	-		-	-
2	1 to 3	1	2.2	730		2	1		1246 l/p/d	
3	2	2	2.9	406		3	2		196	
4	2 to 3	0	2.6	66	Frequently vacant	3	0		643	Frequently vacant
5	5	1	5.4	255		5	1		655	
6	6	2	6.3	49	Frequently vacant	0	2		75	Frequently vacant
7	4	1	4.0	191		5	1		149	
8	3	1 to 3	3.4	219		3	1 to 3		265	
9	5	1 to 7	6.3	535	Frequent visitors	5	1 to 7		126	Frequent visitors
10	3	1 or 2	3.1	222		-	1 or 2		-	
11	2	1 to 3	2.7	386		-	1 to 3		-	
12	3	1 to 3	4.1	204	Frequent visitors	3	1 to 3		212	Frequent visitors
13	0	0	0.0	0	Vacant	0	0		0	Vacant
14	-	-	-	-		2 to 3	-		485	
15	4	0	4.0	375		4	0		469	
16	4	0	4.0	145		4	0		660	
17	0	0	0.0	Minor leak?	Vacant	0	0		0	Vacant
18	-	-	-	-			-		-	Variable/ vacant
19	2	-	2.4	1161			-		-	Variable/ vacant
20	1	0	1.0	144	Usu absent w/ends	1	0		387	Usu absent w/ends
21	1	1 or 5	1.4	568		2	1 or 5		614	
22	1 to 4	0	2.8	317		5	0		651	
23	1	1	1.0	75	Away Oct/ Nov	2	1		126	
24	1 occasion	1	0.0	0	Vacant	0	0		0	Vacant
Estimated average water use litres/person/ day based on a population estimate of 63				**357 l/p/d**	**56 days 26 September to 21 November 2005**	**Estimated average water use litres/ person/day based on a population estimate of 63**			**435 l/p/d**	**25 days from 27 February to 24 March 2006**

Note: Households have been allocated coded numbers to provide anonymity to residents.

Appendix 10: Yarilena weekly menu

Breakfast: Weekday	Weetbix, rice bubbles, milk Toast, jam or honey, vegemite, cheese, margarine Tea, sugar, milk
Weekend	Bacon and eggs Or baked beans on toast Or tinned spaghetti on toast Or cereal and toast Tea, sugar, milk
Lunch	Bread with cheese or ham or leftover meat Or toasted cheese and ham, or silverside Bread with peanut butter, bread with honey Or in town – pie/pasty or chips and gravy and drink Tea, sugar, milk
Dinner	Potato bake, or vegie bake – i.e. cheese, vegies baked Or tuna casserole Or spaghetti bolognaise Or ham or silverside with mashed potatoes, carrots, broccoli or a salad Or roast meat and vegetables on the weekend Or soup made fresh once a week Or fish fingers or hamburgers (frozen section of supermarket) chicken wings or sausages and occasionally chops with vegetables. Dessert might be ice cream
Snacks in between meals	Children might eat bread with peanut butter or 2 minute noodles Fruit x 2 per person per day Cordial

Appendix 11: Yarilena - Survey of food, health consumables and health hardware costs

Supermarket shelf items per fortnight	Cost of items at Ceduna $	Cost of items at Adelaide $	AGHE per fortnight for 2 adults and 2 children	Actual amounts bought	Total for Ceduna $	Total for Adelaide $
Weetbix 1kg	5.31	4.39	2	2	10.62	8.78
Rice Bubbles 850 g	7.77	6.98	1	1	7.77	6.98
Bread loaf	2.49	1.79	14	14	34.86	25.06
Spaghetti B&G tin	1.08	F/L .89	1	5	5.40	4.45
Noodles Maggi 2 min. -5 pk	3.37	2.93	2	2	6.74	5.86
Flour B&G SR 2kg	3.40	1.79	1	2	6.80	3.58
Rice 2 kg	2.83	2.29 B&G	750g	750g	1.07	.86
Biscuits Sao 250g	2.39	2.01	3	3	7.17	6.03
BBQ shapes	2.49	1.99	Not listed	4	9.96	7.96
Pasta San Remo 500 g	1.59	1.89	750g	1kg	3.18	3.78
Biscuits Arnott classic assorted	5.69	4.74	1	2	11.38	9.48
Salad dressing Praise	3.31	2.89	Not listed	2	6.62	5.78
Mayonnaise Praise 470 g	3.77	3.29	Not listed	1	3.77	3.29
Cake mix White Wings choc	5.42	4.12	1	2	10.84	8.24
Total					**$126.18**	**$100.13**

Consumable food per fortnight	Cost of items at Ceduna $	Cost of items at Adelaide $	AGHE per fortnight for 2 adults and 2 children	Actual amounts bought	Total for Ceduna $	Total for Adelaide $
Jam IXL	3.93	3.39	1	1	3.93	3.39
Canola oil 2 L	5.70	5.94 B&G	0.5	1 L	2.85	2.97
Salt 125 g	1.61	1.38 100g	Not listed	125g	1.61	1.38
Cordial Cottees 2 lt	5.30	3.95	0.5	4 L	10.60	7.90
Just Juice 2 lt	3.96	3.58	Not listed	4 L	7.92	7.16
Teabags Dilmah 200	6.96	6.99	Not listed	100	3.48	3.50
Coffee 150g Nescafe blend	8.08	6.48	Not listed	150g	8.08	6.48
Mixed herbs McCormicks	1.84	1.69 Masterfoods	1	1	1.84	1.69
honey IGA500g	5.08	4.49 Panda brand	0.5	500g	5.08	4.49
Peanut butter Foodland 1litre	4.40	780g B&G 3.78	0.5	1 L	4.40	4.85
Ice Cream 4 litre B & G	5.60	4.69	0.5	2 L	2.80	2.35
Sugar 2 kg	3.42	CSR 2.46?	0.5	2 kg	3.42	2.46
Vegemite 445g	7.60	5.98	Not listed	1	7.60	5.98
Crumpets 6pk	1.79	2.39	Not listed	2	3.58	4.78
Tomato sauce Foodland	1.79	1.59	Not listed	1	1.79	1.59
HP Sauce	3.54	2.46	Not listed	1	3.54	2.46
Milo 450g	6.04	4.99	Not listed	450g	6.04	4.99
Total					**$78.56**	**$68.42**

Meat & dairy per fortnight	Cost of items at Ceduna $	Cost of items at Adelaide $	AGHE per fortnight for 2 adults and 2 children	Actual amounts bought	Total for Ceduna $	Total for Adelaide $
Milk 3L	3.75	3.75		8	30.00	30.00
Cheese slices B&G 1 kg	7.48	3.29 for 500g	350g	1kg	7.48	6.58
Yoghurt Ski 1 Kg	4.89	4.49	750g	2kg	9.78	8.98
Mince 1kg	8.99	7.99 quality 8.99 prem.	1 kg	2 kg	17.98	15.98
Sausages 500g	4.10	4.48/kg	500g	1 kg	8.20	4.48
Bacon 250g	4.39	2.26	250g	500g	8.78	4.52
Silverside 1 kg	9.69	6.98	1 kg	1 kg	9.69	6.98
Chicken drumsticks 1kg	5.29	4.69	additional	1kg	5.29	4.69
Lamb roast 1.25 kg	10.99	8.30	additional	1.25 kg	10.99	8.30
Baked beans B&G	.99	.69	1	3	2.97	2.07
Tuna Seakist 425g	3.59	2.99	1	2	7.18	5.98
Eggs 1 dozen	3.39	2.29	0.75	2	6.78	4.58
Chicken 1 cooked	10.00	6.99		2	20.00	13.98
Total					**$145.12**	**$117.12**

Fruit & vegetables per fortnight	Cost of items at Ceduna $	Cost of items at Adelaide $	AGHE per fortnight for 2 adults and 2 children	Actual amounts bought	Total for Ceduna $	Total for Adelaide $
Tomatoes 1 kg	4.99	3.99	1kg	1 kg	4.99	3.99
Potatoes 5 kg	5.49	6.99	7.5 kg	10 kg	10.98	13.98
Lettuce	3.39	2.49	1.5	2	6.78	4.98
Carrots 1 kg	1.79	1.49	1.8 kg	2 kg	3.58	2.98
Broccoli 1 kg	7.99	6.99	additional	500 g	4.00	3.50
Cabbage 1	3.49	4.29	1 .5	1	3.49	4.29
Soup veg pack 1kg	3.69	2.79	additional	2 kg	7.38	5.58
Celery ½	2.35	1.59	additional	1/2	2.35	1.59
Onion 1 kg	2.79	2.79	1.5 kg	1.5 kg	4.19	4.19
Cucumber	2.29	1.67	additional	2	4.58	3.34
Watermelon 1 kg	1.49	1.49	additional	4 kg	5.96	5.96
Apples 1 kg Royal Gala	5.29	4.99	2.5 kg	2.5 kg	13.23	12.48
Cauliflower whole	6.99	4.99	additional	1	6.99	4.99
Tomatoes large tin	2.41	1.69	1	1	2.41	1.69
Apricots tinned 825g	3.94	3.39	440g	440 g	2.10	1.80
Frozen peas Birds Eye 500g	2.22	1.49	750g	1 kg	4.44	2.98
Beetroot Golden Circle 450 g	1.79	1.45	1	1	1.79	1.45
Oranges 1 kg	4.40	3.99	2.3	1 kg	4.40	3.99
Bananas 1 kg	13.29	13.99	3 kg	2 or 3 only	3.00	3.20
Total					**$96.64**	**$86.96**

Summary of food costs	Yarilena $	Adelaide $
Shelf items	126.18	100.13
Consumable food	78.56	68.42
Meat and dairy products	145.12	117.12
Fruit and vegetables	96.64	86.96
Total food cost per fortnight	446.50	372.63
Total food cost per week	$223.25	$186.23

Health consumables per fortnight	Cost of items at Ceduna $	Cost of items at Adelaide $	Total for Ceduna $	Total for Adelaide $
Soap Country Life 5 pk	1.89	2.69	1.89	2.69
Shampoo IGA 600 ml	3.15	1.99 (Alberto 500 ml)	3.15	1.99
Conditioner IGA 600 ml	3.15	1.99 (Alberto 500 ml)	3.15	1.99
Toothbrush B & G	0.61	2.17 (TEK)	0.61	2.17
Toothpaste McLeans 120 g	2.90	2.25	2.90	2.25
Toilet paper Sorbent 8 pk	7.91 x 2	4.99 x 2	15.82	9.98
Huggies 72 pk	44.99	35.99 (NA Huggies 90s Crawler)	44.99	35.99
Wet Ones	5.30	6.26 (NA Huggies Baby Wipes)	5.30	6.26
Tissues Sorbent	2.42 x 2	2.42 x 2	4.84	4.84
Paracetamol B&G 24	1.06	0.79	1.06	0.79
Shaving cream Nivea 200 ml	6.02	5.99	6.02	5.99
Fly spray Mortein	5.65	4.15	5.65	4.15
Repellent Aeroguard roll on	5.92	4.53	5.92	4.53
Total			**$101.30**	**$83.62**

Health consumables per month	Cost of items at Ceduna $	Cost of items at Adelaide $	Total for Ceduna $	Total for Adelaide $
BandAids 100	7.45	6.98	7.45	6.98
Dencorub	5.55	4.97	5.55	4.97
Rubber gloves B&G	0.76	0.59	0.76	0.59
Floor cleaner Pine O'Clean	2.89	3.67	2.89	3.67
4 in 1Pine O'Clean 500 ml	4.49	3.49	4.49	3.49
Laundry detergent B&G 1 kg	2.52	2.15	2.52	2.15
Sponge B&G 5	2.31	1.79	2.31	1.79
Dish detergent Earth Choice	1.89	1.99	1.89	1.99
Pads StayFree reg. 20	6.11	4.48	6.11	4.48
Deodorant Nivea 50 ml	3.77	3.28	3.77	3.28
Razor Gillette Sensor 4 pk	6.81	2.29 (5 pk BIC)	6.81	2.29
Total cost per month			$44.55	$35.68
Total cost per fortnight			$22.28	$17.84

Summary of health consumables costs	Yarilena $	Adelaide $
Health consumables - fortnightly items	101.30	83.62
Health consumables - monthly items	22.28	17.84
Total health consumables cost per fortnight	123.58	101.46
Total health consumables cost per week	$61.79	$50.73

Health hardware item	Cost	Cost per year
Pots and pans Thrifty Link	$100.00 over 4 years	25.00
Jug Sunbeam cordless filter 1.8 L	$34.95 over 4 years	8.74
Frypan Sunbeam electric	$49.95 over 4 years	12.49
Toasters Sunbeam basic	$39.95 over 4 years	9.99
Iron Phillips 3100 Elaine	$89.95 over 4 years	22.49
Microwave LG 32 litre Intellowave Sensor	$199.00 over 4 years	49.75
Cutlery	$20.00 over 2 years	10.00
Crockery Riviera 20 pce dinner set	$39.95 over 2 years	19.98
Glasses	$20.00 over 2 years	10.00
Plastic cups	$10.00 over 2 years	5.00
Mop Oates Foodland (FL)	$11.12 x 2 (Ad $9.98)	22.24
Broom B&G (FL)	$5.46 (Ad $5.49)	5.46
Dustpan and brush (TL)	$3.95	3.95
Sabco laundry scrub (TL)	$5.95	5.95
Fridge new	$1000+ over 10 years	100.00
Fridge secondhand	$200.00 over 2 years	
Washing machine Simpson 8kg top loader	$799.00 over 6 years	133.00
TV LG 66cm pure flat widescreen	$699.00 over 8 years	87.38
Pillow polyester	$11.95 (2 per year)	23.90
Bath towel Elements	$16.95 (4 per year)	67.80
Sheet set Paddington Lane fitted	$59.95 (2 per year)	119.90
Blanket Elements acrylic	$69.95 over 2 years	34.98
Tea towels	$2.00 each (4 per year)	8.00
Total cost for health hardware per year		**$786.00**
Total cost for health hardware per week		**$15.11**

Appendix 12: Comparison of food and health consumables costs between Yarilena and Adelaide

Food costs

Total cost for consumable food and non-alcoholic beverages for Yarilena for 2 adults and 2 children under 15: $446.50 per fortnight, $223.25 per week.

Total cost for consumable food and non-alcoholic beverages for Adelaide for 2 adults and 2 children under 15: $372.63 per fortnight, $186.32 per week.

Based on these figures, Yarilena residents pay $36.93 per week or 19.8% more for food than residents in Adelaide.

Percentage of hypothetical income spent on food and non-alcoholic beverage at Yarilena: 36.6%. This does not include take-away food or school lunches.

Yarilena residents spend an additional $15.00 per week for school lunches and snacks in town which has not been included in the above calculation. If included, weekly expenditure for food and beverages totals $238.25. This is 39.1% of the weekly income for the hypothetical family.

Health consumables

Total cost for health consumables for Yarilena residents: $123.58 per fortnight, $61.79 per week.

Total cost for the same items in Adelaide: $101.46 per fortnight, $50.73 per week.

Yarilena residents pay $11.06 per week or 21.8% more for health consumables than and totals $11.06 more than residents in Adelaide.

Percentage of income spent on health consumables by the hypothetical family at Yarilena: 10.1%.

Appendix 13: Scotdesco weekly menu

Breakfast	Weetbix, milk, porridge, baked beans, spaghetti Eggs, bacon Toast, tomato Tea, sugar, margarine
Lunch	Chops, ham, cheese on bread, tinned meat, tuna, Cup-a-Soup, home made soup Or in town when shopping – take-away $15 to $20 per household
Dinner	Vegetables and meat e.g. roast with potatoes, pumpkin, broccoli, cauliflower, beans Or chops with vegetables Or fresh fish such as salmon or tommy, whiting or crayfish Or on weekends especially, wombat or kangaroo or sleepy lizard Dessert – ice-cream or custard with tinned peaches or fruit salad Fresh fruit – apples, oranges, pears or whatever is in season

Appendix 14: Scotdesco hypothetical family 1 – survey of food, health consumables and health hardware costs

Supermarket shelf items per fortnight	Cost of items at Ceduna $	Cost of items at Adelaide $	Amounts based on AGHE per fortnight and 2 adults	Actual amounts bought	Total for Scotdesco $	Total for Adelaide $
Weetbix 1 kg	5.31	4.39	1kg	1 kg	5.31	4.39
Porridge oats 500 g	1.22	1.22	500g	2	2.44	2.44
Bread loaf	2.49	1.79	8	10	24.90	17.90
Spaghetti B&G tin	1.08	0.99	1	2	2.16	1.98
Baked beans, B&G	0.99	0.69	1	2	1.98	1.38
Flour B&G SR 2kg	3.40	1.79	1	2	3.40	1.79
Biscuits Sao 250g	2.39	2.01	1	2	4.78	4.02
Pasta San Remo 500 g	1.59	1.89	750g	2	3.18	3.78
Biscuits Arnott classic assorted	5.69	4.74	1	1	5.69	4.74
Salad dressing Praise	3.31	2.89	Not listed	1	3.31	2.89
Mayonnaise Praise 470 g	3.77	3.29	Not listed	1	3.77	3.29
Chilli sauce classic 250 ml	2.69	1.99	Not listed	1	2.69	1.99
Cake mix white choc	5.42	4.12	1	1	5.42	4.12
Total					**69.03**	**54.71**

Meat and dairy products per fortnight	Cost of items at Ceduna $	Cost of items at Adelaide $	Amounts based on AGHE per fortnight and 2 adults	Actual amounts bought	Total for Scotdesco $	Total for Adelaide $
Milk 3 litres	3.75	3.75		12 litres	15.00	15.00
Cheese slices B&G 1 Kg	7.48	3.29 (500g)	500g	1 kg	7.48	6.58
Yoghurt Ski 1 kg	4.89	4.49	500g	1 kg	4.89	4.49
Bacon 250g	4.39	2.26	250g	2	8.78	4.52
Lamb 1 kg Side of	9.00	9.80		5 kg	45.00	49.00
Tinned meat - corned beef 340g	3.86	3.75		2	7.72	7.50
Tuna Seakist 425g	3.59	2.99	1	2	7.18	5.98
Eggs 1 dozen	3.39	2.29	0.5 doz	1 doz	3.39	2.29
Total					**99.44**	**95.36**

Fruit and vegetables per fortnight	Cost of items at Ceduna $	Cost of items at Adelaide $	Amounts based on AGHE per fortnight and 2 adults	Actual amounts bought	Total for Scotdesco $	Total for Adelaide $
Tomatoes 1 kg	4.99	3.99		500g	4.99	3.99
Potatoes 5 kg	5.49	6.99		5 kg	5.49	6.99
Lettuce	3.39	2.49		1	3.39	2.49
Carrots 1kg	1.79	1.49		1kg	1.79	1.49
Broccoli 1 kg	7.99	6.99		500 g	4.00	3.50
Cabbage whole	3.49	4.29		Half	1.75	2.15
Soup veg pack 1kg	3.69	2.79		1	3.69	2.79
Celery ½	2.35	1.59		Additional	2.35	1.59
Onion 1 kg	2.79	2.79		1 kg	2.79	2.79
Cucumber	2.29	1.67		1	2.29	1.67
Watermelon 2 kg	1.49	1.49		2 kg	2.98	2.98
Apples 2kg royal gala	5.29	4.99		2 kg	5.29	4.99
Cauliflower half	6.99	4.99		Additional	6.99	4.99
Tomatoes tinned	2.41	1.69		1	2.41	1.69
Peaches tinned 825 g	4.06	3.24		1	4.06	3.24
Frozen peas Birds Eye 500g	2.22	1.49	750 g	500 g	2.22	1.49
Beetroot Golden circle 450 g	1.79	1.45		1	1.79	1.45
Oranges 1 kg	4.40	3.99		2.3	4.40	3.99
Total					**62.67**	**54.27**

Consumable food per fortnight	Cost of items at Ceduna $	Cost of items at Adelaide $	Amounts based on AGHE per fortnight and 2 adults	Actual amounts bought	Total for Scotdesco $	Total for Adelaide $
Jam IXL	3.93	3.39	1	1	3.93	3.39
Canola oil 2 litre	5.70	5.94	0.5	1 litre	2.85	2.97
Salt 125 g	1.61	1.38	Not listed		1.61	1.38
Cup-a-soup 75g	1.96	1.79	Not listed	1	1.96	1.79
Just Juice 2 litre	3.96	3.58		1	3.96	3.58
Teabags Dilmah 100	3.48	3.50	Not listed	1	3.48	3.50
Coffee 150g Nescafe blend	8.08	6.48	Not listed	1	8.08	6.48
Mixed herbs	1.84	1.69	1	1	1.84	1.69
Ice Cream 4 litre	5.60	4.69	0.25	1 litre	1.40	1.17
Custard powder	0.99	0.86	0.5	1	0.99	0.86
Sugar 1kg	3.42	2.46	0.25	500 g	1.71	1.23
Crumpets 6pk	1.79	2.39		1	1.79	2.39
Tomato sauce Foodland	1.79	1.59		0.5	.90	.80
HP Sauce	3.54	2.46		0.5	1.77	1.23
Milo 450g	6.04	4.99		0.5	3.02	2.50
Total					**39.29**	**34.96**

Summary of food costs	Scotdesco $	Adelaide $
Shelf items	69.03	54.71
Fruit and vegetables	62.67	54.27
Meat and dairy products	99.44	95.36
Consumable food	39.29	34.96
Total food cost per fortnight	$270.43	$239.30
Total food cost per week	$135.22	$119.65

Health consumables per fortnight	Cost of items at Ceduna	Cost of items at Adelaide	Total for Ceduna $	Total for Adelaide $
Toothbrush B & G	0.61	2.17 (TEK)	0.61	2.17
Toothpaste McLeans 120 g	2.90	2.25	2.90	2.25
Toilet paper Sorbent 8 pk	7.91 x 2	4.99 x 2	15.82	9.98
Tissues Sorbent	2.42 x 2	2.42 x 2	4.84	4.84
Paracetamol B&G 24	1.06	0.79	1.06	0.79
Fly spray Mortein	5.65	4.15	5.65	4.15
Repellent roll on Aeroguard	5.92	4.53	5.92	4.53
Total			**$36.80**	**$28.71**

Health consumables per month	Cost of items at Ceduna	Cost of items at Adelaide	Total for Ceduna $	Total for Adelaide $
BandAids 100	7.45	6.98	7.45	6.98
Dencorub	5.55	4.97	5.55	4.97
Rubber gloves B&G	0.76	0.59	0.76	0.59
Floor cleaner Jaysol 1 litre	5.17	3.67 (Pine O'Clean)	5.17	3.67
Pine O'Clean 4 in 1 500 ml	4.49	3.49	4.49	3.49
Laundry detergent B&G 1 kg	2.52	2.15	2.52	2.15
Sponge B&G 5	2.31	1.79	2.31	1.79
Dishwashing detergent Earth Choice	1.89	1.99	1.89	1.99
Pads StayFree reg. 20	6.11	4.48	6.11	4.48
Deodorant Nivea 50 ml	3.77	3.28	3.77	3.28
Razor Gillette Sensor 4 pk	6.81	2.29 (5 pk Bic)	6.81	2.29
Shampoo IGA 600 ml	3.15	1.99 (Alberto)	3.15	1.99
Conditioner IGA 600 ml	3.15	1.99 (Alberto)	3.15	1.99
Shaving cream Nivea 200 ml	6.02	6.02	6.02	6.02
Soap Country Life 5 pk	1.89	2.69	1.89	2.69
Total cost per month			$61.04	$48.37
Total cost per fortnight			$30.52	$24.19

Summary of health consumables costs	Scotdesco $	Adelaide $
Health consumables - fortnightly items	36.80	28.71
Health consumables – monthly items	30.52	24.19
Total health consumables cost per fortnight	67.32	52.90
Total health consumables cost per week	$33.66	$26.45

Appendix 15: Comparison of food and health consumables costs between Scotdesco and Adelaide

Hypothetical family 1: two adults, no children

	Food	Health consumables	Total
Scotdesco	$135.22	$33.66	$168.88
Adelaide	$119.65	$26.45	$146.10

Food costs

Total weekly food costs (excluding take-away food) for hypothetical family 1: $135.22

Cost of the same food in Adelaide: $119.65

Percentage increase in cost of food for hypothetical family 1 at Scotdesco is 13% or $15.57 more than the same food purchased in Adelaide.

Percentage of income spent on food by hypothetical family 1 at Scotdesco: 26.7%.

Health consumables costs

Total weekly health consumables costs for hypothetical family 1: $33.66

Cost of the same items in Adelaide: $26.45

Hypothetical family 2: three adults

	Food	Health consumables	Total
Scotdesco	$202.83	$50.49	$253.32
Adelaide	$179.49	$39.69	$219.18

Food costs

Total weekly food costs (excluding take-away food) for hypothetical family 2: $202.83

Cost of the same food in Adelaide: $179.49

Percentage increase in cost of food for hypothetical family 2 at Scotdesco is 13% or $23.34 more than the same food purchased in Adelaide.

Percentage of income spent on food by hypothetical family 2 at Scotdesco: 26.5%

Health consumables costs

Total weekly health consumables costs for hypothetical family 2: $50.49

Cost of the same items in Adelaide: $39.69

Hypothetical family 3: one adult

	Food	Health consumables	Total
Scotdesco	$67.61	$16.83	$84.44
Adelaide	$59.83	$13.23	$73.06

Food costs

Total weekly food costs (excluding take-away food) for hypothetical family 3: $67.61

Cost of the same food in Adelaide : $59.83

Percentage increase in cost of food for hypothetical family 3 at Scotdesco is 13% or $7.78 more than the same food purchased in Adelaide.

Percentage of income spent on food by hypothetical family 3 at Scotdesco: 26.5%

Health consumables costs

Total weekly health consumables costs for hypothetical family 3: $16.83

Cost of the same items in Adelaide: $13.23

Appendix 16: Distribution of population in Davenport, February 2007

Household No.	No. of Bedrooms	Total Residents	Adults	Children <15	Children 15-19
1	0	0	0	0	0
2	1	0	0	0	0
3	1	0	0	0	0
4	1	0	0	0	0
5	1	0	0	0	0
6	5	0	0	0	0
7	2	1	1	0	0
8	2	1	1	0	0
9	2	1	1	0	0
10	2	2	1	1	0
11	4	3	1	2	0
12	2	3	1	2	0
13	4	4	1	3	0
14	3	6	1	3	2
15	1	2	2	0	0
16	1	2	2	0	0
17	4	2	2	0	0
18	2	2	2	0	0
19	3	3	2	0	1
20	3	3	2	0	1
21	3	3	2	0	1
22	3	5	2	0	3
23	1	2	2	0	0
23	2	3	2	1	0
24	4	6	2	2	2
25	3	4	2	2	0
26	3	4	2	2	0
27	4	7	2	3	2
28	2	7	2	4	1
29	2	3	3	0	0
30	3	6	3	0	3
31	3	4	3	1	0
32	3	4	3	1	0
33	3	6	3	2	1
34	4	4	4	0	0
35	4	4	4	0	0
36	4	4	4	0	0
37	3	4	4	0	0
38	3	4	4	0	0
39	2	4	4	0	0
40	4	7	4	3	0
41	3	5	5	0	0
42	3	15	5	8	2
43	3	8	6	2	0
Total	**116**	**158**	**97**	**42**	**19**

Source: Community collected data Feb 2007

Appendix 17: Davenport weekly menu

Breakfast: Weekday **Weekend**	Breakfast cereal – Weetbix, Cornflakes, Rice Bubbles Toast with butter and vegemite Tea or coffee with milk and sugar Orange juice Eggs and/or baked beans/or tinned spaghetti Toast Cereal Tea or coffee with milk and sugar
Lunch	Sandwich– chicken, tuna, ham or turkey with salad Or sliced cheese and gherkin and salami Or salad Fresh fruit 3 times per week e.g. apple, watermelon or grapes Choc Top ice-cream 1 per week Tea, iced tea, coffee
Dinner	Roast lamb with vegetables e.g. potatoes, carrots, broccoli, onions, gravy Or fish with hot chips and salad Or rice with vegetables and Canton sauce Or BBQ and salad Or stir-fry with rice and vegetables Or spaghetti bolognaise with tomato, capsicum, carrot and garlic Glass cordial, or orange juice and soda or lemonade or beer Yoghurt or biscuits or ice cream or trifle and tinned fruit [NB: the cost of soft drinks and beer not included in weekly food costs as these are seen as additional to essential weekly costs].

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