

# WHAT LIES BENEATH

## SUSTAINABLE GROUNDWATER MANAGEMENT FOR COMMUNITIES OF INDIGENOUS PEOPLE

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**Abstract:** This paper examines sustainable management of groundwater resources in remote Australian Indigenous communities. It is well understood that hydrological knowledge, including a balanced water budget is essential. However, for Indigenous communities, hydrological knowledge is only one challenge to sustainable management of ground water resources. An analysis of water provision to a remote Indigenous community highlights fundamental issues for sustainable water management plans. The case study outlines how specific issues encompassing cultural lifestyle, technological solutions, bureaucratic organisation and access to natural resources affect water provision and management. Addressing these issues is critical to sustainable resource management in Indigenous communities. An adaptive framework, derived from international experience may facilitate sustainable water supplies through a shift from the current service-delivery model to a demand-responsive model.

**Key Words:** management plan, groundwater management, water supply, Indigenous communities.

### INTRODUCTION

This paper discusses challenges in achieving a sustainable management approach to groundwater resources in remote Australian Indigenous communities. The focus is on outstations and homelands which are small remote communities usually with a population of 100 or less. A review of water supplies and sanitation in 2000 (HREOC 2001) found there had been significant improvements in water infrastructure and treatment technologies installed in communities in recent years. However, long-term sustainability and security of water supply remain challenges for the homelands and outstations. This paper discusses the underlying causes of the water supply issues through a case study. Critical analysis of the case study identifies the fundamental issues of cultural lifestyle, reliance on technological solutions, bureaucratic organisation and access to natural resources as affecting current water provision and management. Finally this paper suggests that lessons learnt from international experience may provide a framework for improving long-term water management. It highlights the need to change the current service delivery model in Australia and the consequent approach to community development projects. The model presented provides an opportunity to embrace the cultural context of remote Indigenous communities and facilitate sustainable outcomes.

### BACKGROUND

#### Homelands and Outstations<sup>1</sup>

Indigenous people living on outstations and homelands represent 82 % of discrete Indigenous communities (ABS 1999). These communities of Indigenous people are the smaller, typically remote communities with a variable population of 100 people or less. There are 1063 of these communities within Australia which in total support a population of 23,136 people, or 21% of the Indigenous population (Grey-Gardner 2000).

The number of discrete communities with a population less than 100 that rely on bore water for the main supply of water is shown in Table 1. The discrete communities represented are concentrated in the more remote areas of the Kimberley (WA), Arnhem Land (NT) and the central desert region (SA, WA and NT).

**Table 1. Groundwater supplies for Indigenous communities with a population of 100 or less**

State*or Territory	Number of communities	Number of communities on bore water	Percent communities on bore water	Reported population in communities on bore water
NT	588	417	71 %	8226
NSW	35	6	15 %	425
TAS	1			
WA	235	182	78 %	4365
SA	90	47	52 %	730
QLD	109	22	20 %	393
<b>TOTAL</b>	<b>1058**</b>	<b>674</b>		<b>14139</b>

\* Victoria and the Australian Capital Territory do not have communities with a population of 100 or less.

\*\* Six NT communities did not state their type of water supply.

<sup>1</sup> A homeland or outstation is a community of Indigenous Australian people which has been established on or nearby traditional country. It is sometimes referred to as the 'Homelands Movement' or 'Returning to Country'.

Table 1 records significant numbers of Indigenous people living in remote areas largely using groundwater resources. Difficulties associated with supplying a sustainable water supply from a bore initially concern the quality and quantity of the supply. However, for these discrete communities, as supplies become more difficult to secure, the use of technology appears to increase and often adds complexity to supply infrastructure.

Where State and Territory authorities are not involved in the maintenance and supply of water to outstations, the responsibility then has to be taken up by outstation resource centres. While these centres are funded by ATSIC<sup>2</sup>, there are generally little carry over of funds or acquired knowledge and skills to ensure the sustainability of modern water treatment technologies. While some outstation communities supplement their bore water supply through the use of traditional water supplies<sup>3</sup> such as maintaining rockholes or supplementing a bore supply by using a traditional soak, overall, sustainable use of groundwater is a challenging new concept.

Furthermore, Indigenous communities as we know them today are a legacy of settlements around ration stations or mission establishments. Settled mixes of different family, tribal and skin groupings are new and many of the social issues arise from the new types of community-living which has no traditional basis for Aboriginal people (Rowse 1999).

Sustainable use of groundwater and community living are not universal principles. These two concepts are relatively new to Indigenous people as are the assumed incumbent responsibilities.

## The Water Report

A review of Recommendation 7 of the *Water Report*<sup>4</sup> was published by FRDC (2001). The *Water Report Review* documented significant improvements in water supply and provision to Indigenous communities between 1994 and 1999. At a national program level the trend had been toward increased investment in water and sanitation infrastructure by the Commonwealth and States. The Review observed an increased involvement by the States and the commercial sector in ongoing systems operation, management and maintenance.

The *Water Report Review* noted that the remote communities have greater access to improved services but found that the sustainability of the water treatment technology and service delivery to these communities depended on an ongoing role of the State agency or regional service provider. There was no apparent indication that discrete communities had acquired or accepted more responsibility for their water management. This trend leaves the outstations and homelands, with a backlog of unmet need which for the next ten years is estimated at \$230 million for new essential services infrastructure with an additional \$50 million per year needed to maintain existing services (ATSIC 2001). This situation is based in a regulatory framework which, at this stage, does not support self-management and is increasingly unfundable.

## A CASE STUDY

### Mpweringe-Arnapipe

Mpweringe – Arnapipe is an association of 6 family groups living on a thin strip of land 46-75 Km north of Alice Springs. The families live in about 14 outstations on traditional land on unused stock routes, unused rail land and at Yamba Station. The outstations are provided with essential services through Ingkerreke Resource Centre.

In 1994 the families were living on unused stock routes although they would have preferred to live on traditional land nearby which was proposed for excision. The families, which had a fluctuating population of approximately 184 people and 38 people resident, did not have secure land tenure and consequently water infrastructure could not be supplied. The Ingkerreke Resource Centre therefore had to cart water to each outstation. Ingkerreke hired trucks at \$60 – 100/day with the cost of the cartage being borne by the outstation families. The actual cost of the water was approximately 237 times the cost of town water (FRDC 1994).

By 1999 Mpweringe – Arnapipe had a resident population of about 115 people. The population varies considerably and intra community mobility (mainly between outstations) is high. The condition of water supplies has improved primarily due to the installation of engineered interventions including bores and water treatment technology such as solar powered reverse osmosis systems.

However issues of water supply still exist:

- The family group at 16 Mile, had to move away from the outstation because of ‘sorry business’<sup>5</sup>. The family now live at a new camp which is too far away to access the bore and reverse osmosis unit of the water supply.
- Cartage of water is essential for some outstations<sup>6</sup>.

<sup>2</sup> Aboriginal and Torres Strait Islander Commission

<sup>3</sup> According to Peterson (1978) traditional water sources are generally surface water –

- ephemeral sources, including shallow claypans, hollows in trees, water bearing roots, water bearing frogs, dew and dams,
- rockholes,
- waterholes,
- soakages,
- permanent water and springs.

<sup>4</sup> In 1994 the Federal Race Discrimination Commissioner (FRDC) published *Water: A Report on the Provision of Water and Sanitation in remote Aboriginal and Torres Strait Islander communities*. The *Water Report* questioned many of the fundamental assumptions that informed policies and processes in service delivery to Aboriginal and Torres Strait Islander communities.

Recommendation 7 states “That the Race Discrimination Commissioner review progress made in the wake of this Report in the light of the recommendations, the Government’s response to the Report, and the state of water and sanitation services in the ten case study communities; and this review commence in one year’s time”.

<sup>5</sup> ‘Sorry business’ is a time of bereavement and depending on the relationship ties it may be necessary for family members to leave the place where the person lived.

<sup>6</sup> Given the high costs of water cartage, Ingkerreke Outstation Resource Centre decided that it would be cost effective to purchase their own truck.

- The community at Burt Creek purchased a pump manufactured in Italy. It may well have been good value at the time of purchase but it recently broke down and is proving difficult to repair.
- Negotiations are still in process for some family groups. The system of protracted legal negotiations has left these families without a dependable water supply until there is restitution. The families at Harry Creek East, for example, need to move to make way for the new Alice-Darwin railway development. The community will move to an excision within the Yambah pastoral lease. The water supply is 2.5 km outside the excision.

In a general sense this case study is reflective of a number of other small community groups. Individually the issues can be addressed however it provides an example of the unmet need in essential service infrastructure and maintenance requirements and justifies the dissatisfaction with the situation. The case study describes in context the four issues of cultural lifestyle, scarce natural resources, technical solutions and bureaucratic organisation.

## 1. CULTURAL LIFESTYLE

Aboriginal people choose homelands-living principally for purposes of cultural and social survival (McDermott 1998). Returning to Country allows Indigenous people the opportunity to care for country, re-establish the importance and authority of the family and teach young people their cultural heritage.

“Many Aboriginal people relate the concept of residency to an area rather than a specific community”(Warchiver et al 2000:447). Movement between large communities and outstations is essential and may be influenced by a number of factors. The reasons for travel include children attending school, visiting family, attending sporting events and shopping. Attending business or political meetings with mining companies or Indigenous Councils can require trips for thousands of kilometres. The reasons for travel can be unpredictable. Ceremonial or cultural business, such as ‘sorry business’ can require immediate travel for long distances for extended periods of time.

Depending on the reason for the absence, the main place of residence could be uninhabited for up to six months a year. Alternatively, there could be visitors staying for long periods of time. Consequently the number of people living at an outstation at any one time is unpredictable. The unpredictability of peak loads and frequent absences have implications for:

- Maintenance of infrastructure
- Water demand
- Waste water disposal

The fragmented blending of traditional Aboriginal and contemporary cultures continue to challenge the provision of sustainable water supplies. An understanding of cultural obligations is essential in an effective planning process. The realities, unpredictabilities and unique lifestyle actions need to be incorporated such that risks are recognised without trying to control or obscure them. A risk management approach would be a timely, sensitive and eminently pragmatic method of investigating solutions.

## 2. NATURAL RESOURCE

Central Australia is a highly variable environment. Climatic ranges are extreme with maximum temperatures frequently exceeding 40 °C and the winter nights are cold with frosts occurring from May to September. “For most of the area the only predictable feature of the rainfall is its consistent variability” (Latz 1995:3). Rainfall can vary from 500mm for three consecutive years and then reduce to 100mm for a similar period. The unpredictability of rainfall directs communities to groundwater for the main water supply.

Both water quality and water quantity can be problematic depending on location. The main environmental factor affecting groundwater quality is the long retention times which lead to the accumulation of elements that may make the drinking water deleterious to health (Hostetler et al, 1998).

Generally in the Western Desert regions of Australia, the aquifers are shallow with little modern recharge. The water quantity concern is that groundwater extraction rates will increase beyond the sustainable yield. The causes for concern stem from the following issues:

- More recently, the reality is that most of the remaining lands where Indigenous homeland communities are able to settle on is the extremely marginal land. The Mpweringe-Arnapipe outstation Harry Creek East is embarking on a future where they are unlikely to have the water resources to sustain a growing population
- Communities generally do not know how to access data with which to understand the potential water uses and limitations of an aquifer
- Conflict between Indigenous people and other landusers around access to water resources

The conflicts over water quantity and the need to treat the poor water quality often results in expensive technological solutions that allow the community to go back to traditional country.

## 3. TECHNICAL SOLUTIONS

While water treatment systems and pumps may be a part of the solution regarding the provision of quality water supplies to Indigenous communities, it is certainly not the whole solution. Technology installed in communities is frequently very sophisticated and consequently is costly to install and relies on specialist back up service. Generally there is a significant amount of redundancy designed into a system to account for the distance and cost involved in servicing technology. A reverse osmosis system, for example, may be installed with a capacity to treat higher volumes of water than is necessary. The extra capacity means that the unit will be running well within its limitations and should not need a high level of maintenance.

A common assumption is that Indigenous people will be trained to have the skills to maintain the technology. Invariably, however, it is the choice of technology rather than the training which is crucial - given the pace of change in technology and the skills deficit faced by Indigenous people it is not possible to simply offer training as a bridge to improved system performance. Appropriate technology relies on a community being able to assess whether it can sustain particular technologies. Decisions regarding of appropriate technology choice or poor technology is ad hoc and success is unpredictable. Access to reliable information is uncommon for those making decisions about water supply infrastructure in Indigenous communities.

#### **4. BUREAUCRACY OF WATER SUPPLY**

“The return to homelands by small Aboriginal family groups is dependent on the willingness of State and Federal agencies to provide water supply and infrastructure at these chosen sites”(Walker 1991). The Mpweringe-Arnapipe case study describes a protracted Land Rights claims and shows how this impacts on development of the community and affects the immediate living conditions of Indigenous people.

The homelands movement is influenced by a changing political climate and bureaucratic systems that people work under. Development has generally taken place in response to the availability of one off grants leaving little systematic development planning either for the present or the future (Walker 1991). Development is therefore based on short-term priorities – choice of water supply infrastructure or treatment systems can be based on what may be a good deal at the time or simply what is available. An opportunistic windfall may allow a community to secure funding for a reverse osmosis system, and then once it has broken down, secure funds for a rainwater tank – but rarely at the same time and never with adequate planning.

The opportunities for communities to fund water supply infrastructure may be available through grants but these are usually restricted to capital items only. Financial constraints also impose limitations on the ability of small systems to employ skilled operators and maintain the system. The on-going maintenance costs must be covered by the community or local Aboriginal resource agency. Whilst it is not unreasonable to expect a community to maintain their own water supply, it is also reasonable to expect that they had timely access to resources and funds to allocate specifically for maintenance.

When communities rely on grants to purchase infrastructure, the process lends itself to a lack of long-term planning and pursuit of long term benefits. Priority is given to short term benefits - providing immediate water supplies within the constraints of the funding available. The *Water Report* provides evidence which indicates that more expensive water treatment systems do not necessarily secure a sustainable water supply. A crucial issue is the distribution of funds and how to avoid a reactive response to funding cuts instead of funding an innovative and creative process. Current funding systems bolster dependency and short term reactive, opportunistic, unplanned outcomes rather than an innovative ‘demand responsive’ process. It is not difficult to appreciate that the process of service delivery can be self-defeating. If it is desirable to talk of community participation, local maintenance and user contributions it is also reasonable to provide services capable of being supportive and resourcing capacity to do so. Capacity may include training where requested and available.

#### **A WAY FORWARD**

A World Bank review of 25 years of funding water supplies and sewerage projects in developing countries<sup>7</sup> highlighted the need for demand driven as opposed to supply led service provision. The World Bank examined 125 communities in six countries and found that projects which adapted to a demand-responsive approach significantly increased the likelihood of sustainability.

The demand-responsive approach is a consumer-determined process. The process endorses an approach whereby the community themselves are required to identify a need for water provision or water supply service and make decisions integral to the project design. The process provides an adaptive framework in which the challenges to water supply provision in discrete communities may be addressed. There are four common principles that identify the demand-responsive approach:

1. The community identifies a need and seeks improvement
2. The intervention project design includes well-informed decisions about installations and service levels made by the end users - the information integral to the decision includes options and their cost implications
3. Clearly communicated cost-sharing arrangements
4. An emphasis on sustainability

Most importantly, the World Bank review found that sustainability was highest when households themselves, rather than representatives such as elders or traditional leaders, took a prominent role in community consultation. Included in the consultation were consumers preferences regarding choice of technology, location and what contribution the community would make to the project. The community’s contribution determines what level of service the consumers are willing to pay for in terms which match the true market.

There are three elements in the demand responsive process which are significantly different to current participatory approaches in discrete Indigenous communities. Firstly, the need to work at a householder level rather than at the community council or similar level. Secondly, the inclusion of training and on-going support. Finally, clearly communicated and agreed on-going cost-sharing arrangements. The integration of these three elements is worth reviewing as a means to implement sustainable water supplies for discrete Indigenous communities.

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<sup>7</sup> The World Bank conducted a review of 20 years’ of development projects 1978-1998 and published the report “Learning what works, A 20 year retrospective View on International Water and Sanitation Cooperation” by Maggie Black.

According to Black (1998) much promotional work needs to be done with all kinds of stakeholders to progress beyond rhetoric and superficial tinkering with project design to authentic strategies to demand-responsive programming. The shift to a demand responsive framework will have “major implications for institutions, policies, human resources, development and regulatory framework” (Black 1998). Such a shift for service delivery in Australia, will require organisations to change their internal procedures and organisational mandates and most importantly, their relationships with Indigenous people and communities. The concept of community consultation or involvement with stakeholders such as Indigenous people or communities, for example, is generally accepted in theory, but in practice different (and conflicting) interest groups are often overlooked. In reality different interpretations exist of who a stakeholder is, sometimes at the exclusion of the community (Lee 1991).

If the objective is sustainable outcomes, then community consultation practices need to be genuine rather than a mere endorsement process with resultant diminished responsibility. Lammerink et al (1999) describe the danger of misconceptions with the demand-driven approach:

“There is always the danger that advocating increased accountability and responsibility will be seen as a way for governments to cut spending and wash their hands of community contact”.

Accordingly, the demand-responsive needs continued support from government and service providers for self-management to succeed. Likewise Indigenous organisations will be required to realistically define and maintain on-going commitments to developments and understand the essential focus away from beneficiaries of services towards facilitating access to services.

## CONCLUSION

Water management has typically been perceived as a technical problem which was amenable to solution through centralised engineering service providers. In this paper I have demonstrated why this approach needs to shift if sustainable water management is to be achieved. Evidence from CHINS data, The *Water Report Review* and Mpweringe Arnapipe show the potential magnitude of expensive consequences should the current service-delivery model continue to all 1063 discrete communities in Australia.

The most visible issue to challenge water supplies and provision in remote communities is poor technology choice coupled with inadequate support for self-management and training. However, the complexity of the issues are exposed when, in the unique context of Indigenous culture, scarce natural resource, bureaucratic organisation and technological solutions are further examined. The present bureaucratic organisation does not provide authentic opportunity for Indigenous communities to make clear choices about their needs, and on-going responsibility. Self-management is possible if communities of Indigenous people can define their needs within the parameters of cultural difference, cost-sharing arrangements and maintenance options and continue negotiations for on-going funding, training and technical support.

The conclusions from best practice examples worldwide have been introduced in this paper. The lessons learnt from best practice examples worldwide suggest that a demand responsive model may be worth exploring as a means of addressing sustainable water supplies in remote Indigenous communities. The demand responsive approach involves an understanding that technology itself does not lead inevitably to better, reliable water supplies. Thus, being informed about cultural realities and lifestyle choices, enables strategies to deal with risk management and address concepts of appropriate technologies. The challenge ahead is to embrace such an interdisciplinary approach using a demand-responsive process.

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