The use of alternative water sources on urban playing fields: are they acceptable from a community stance?
M. A. Schwecke and B. Simmons

ABSTRACT

Many cities in Australia are experiencing the effects of the current drought. This drought has illustrated the unsustainable nature of the Australian community’s water consumption patterns. In order to change this unsustainable water consumption the community needs to be aware of and encouraged to make use of alternative water sources. This paper draws upon a series of community questionnaires conducted with people who live adjacent to playing fields and golf courses within the Manly Local Government Area, inside the Sydney Metropolitan Area. The questionnaires explored the communities’ attitudes towards and awareness of the use of alternative water sources on public and private recreational land. Using results from the questionnaires this paper outlines the community’s attitudes towards the necessity to use alternative water sources. It also examines the need the community has to be assured that this water does not present a hazard to public health or the environment. Through development of an understanding of community attitudes and awareness, local government and relevant authorities can implement water reuse projects with support from the community.

Key words | community acceptability, stormwater, treated effluent, wastewater

INTRODUCTION

Historically the locations of settlements in Australia have been largely influenced by rainfall and river flow patterns. Australia’s major towns and cities are typically built on the coast were there is a more reliable source of rainfall (Newton 2001). However pressures on the availability of these more reliable water sources are increasing predominately due to population growth and climate change (Dimitriadis 2005).

Over the past century Australians have enjoyed an increasingly improved standard of living. However the secret behind this improvement has been in the unsustain-able use of natural resources (Albrecht 2000). For example the average consumption of water in Australia increased 19% from 1993/94 to 1996/97. Where once water consumption ran parallel with population growth it is now increasing at a greater rate because of intensive use for irrigation and industry, resulting in more water being used than can be replenished (Albrecht 2000). Australians are continually reminded that they live on one of the driest inhabited continents in the world (Albrecht 2000), but the community must also realise that the provision of clean drinking water to our cities puts the Australian water resources under enormous pressure. In 2002 Australia wasted approximately 92% of its city rainfall and 86% of its effluent (Dillon 2002). High levels of water consumption coupled with the recent drought have resulted in many dams reaching all time lows. This has prompted State and Local Government in addition to local industry to investigate the use of alternative water sources to supplement non-potable applications, such as irrigation and toilet flushing.

The water crisis in Australia, caused by one of the longest droughts on record, has now become part of...
day-to-day reality. The key to reducing the pressure on our potable supplies is through the use of alternative water sources (Shaw 2006). In an urbanised environment like much of our major cities and towns, alternative water can be sourced from the numerous sewerage treatment plants or through harvesting the large volumes of stormwater produced during storm events for irrigation use on the many urban playing fields. However, it is important to understand the community response towards irrigating with alternative water sources in order to address any concerns that may arise.

Manly Local Government Area (LGA) is located approximately 11.3 kilometres north-east of the Sydney central business district, and is predominantly populated by non-traditional households, particularly lone person households and couples without families. The dominant dwelling type is apartments (48.8%) with 38.5% in separate homes (Manly Council 2006). The age structure of the community reflects a diverse population, with people aged between 20 and 40 making up the majority of the population. Most of the residents are from English speaking backgrounds, with educational levels amongst the highest in Sydney. In addition Manly also has a large tourist population, with 1,043 tourists staying in the Manly LGA at the time of the 2001 census (Australian Bureau of Statistics 2002). Manly covers an area of 15.14 km², which includes 520 ha of parks, reserves and other forms of open space representing 32% of the local area, it is also bounded by 32.9 km of shoreline (Manly Council 2006).

In partnership with Sydney Water and Manly Golf Club, Manly Council secured grant funding from the NSW Government in 2006 to build a pipe line to transport tertiary treated effluent from the nearby North Head Sewage Treatment Plant to the golf course and surrounding playing fields for irrigation use. This study used questionnaires to investigate the attitudes of people living adjacent to or using irrigated open spaces in Manly in order to determine community acceptance and awareness of alternative water use for irrigation on playing fields.

### RESEARCH DESIGN AND METHODOLOGY

The study centred on Manly Golf course and two playing fields, LM Grahams and Keirle Park, where the use of potable and groundwater for irrigation could be supplemented with tertiary treated effluent from the North Head Sewage Treatment Plant. Currently the source of water for irrigation and the rate of use varies between sites, with the highest level of use occurring at Manly Golf Course (Table 1). The reliance of Manly Golf Course on its three operational bores to provide water for irrigation is placing stress on the groundwater aquifers, particularly during dry periods, resulting in them slowly becoming saline.

Questionnaires containing a mixture of quantitative and qualitative questions relating to the communities awareness of and attitudes towards alternative water use for the irrigation of local playing fields were developed. In addition demographic information and the environmental attitudes and receptivity of respondents towards alternative water use within their own properties were also sought. The questionnaire was mailed to residents surrounding a number of playing fields within Manly LGA in August 2006, in addition questionnaires were provided to the members/players of Manly Golf Club.

Questionnaires and responses were divided into 3 groups. Golf club responses, and two residential responses groups—those residents living within 50 metres from the playing fields, and those located further than 50 metres away. This was in an attempt to see if there were any

| Table 1 | Water used to irrigate open spaces |
|-----------------|-----------------|-----------------|-----------------|
| **Open Space** | **LM Grahams** | **Keirle Park** | **Manly Golf Course** |
| Ownership       | Manly Council   | Manly Council   | Manly Golf Club |
| Area (ha)       | 5.1 ha          | 1.6 ha          | 42.9 ha         |
| Source of irrigation water | Potable & groundwater | Potable | Groundwater |
| Average water use (ML/Year) | 7.21 ML/Year | 3.74 ML/Year | 218.4 ML/Year |
| Average water use (per ha) | 1.41 ML/ha/year | 2.34 ML/ha/year | 5.09 ML/ha/year |
differences in residential responses relating to locality of the proposed alternative water use scheme. Responses from all questionnaires received were entered into a spreadsheet and analysed using Statistical Package for Social Sciences (SPSS). Frequencies, correlations and cross-tabulations between the demographic data and the 3 groups were conducted to identify trends and any significant relationships between the data sets. The demographic data was also compared to the Manly LGA to measure the representativeness of respondents.

RESULTS AND DISCUSSION

Of the 1974 questionnaires distributed to residents in Manly a total of 398 were returned (20%). The highest response rate came from residents outside the 50 metre buffer zone (22%). The representativeness of responses suggests that the data can not be used to make generalisations about other parts of Sydney. Most notably 40% of respondents were aged over 56 years and a further 25% in the 36–45 year group. These proportions are significantly higher than the averages for Manly and the Sydney Metropolitan Area, which have the largest age demographic as 22.9% for above 56 years age group for Manly LGA, and 24% for the below 18 years age group for the Sydney Metropolitan Area (Australian Bureau of Statistics 2002).

A study of the literature conducted by Po et al. (2005) indicated six factors that can influence the public decision to accept or reject water reuse schemes. These were perceived risks and benefits; perceived control over the water quality; trust in authorities, experts and technology; knowledge; personal feelings and emotions and; nature of the proposal. By contrast the results in this study showed that alternative water use attitudes; environmental appreciation; recepetiveness to recycled water; and demographic changes (age correlations, gender, cultural background and education) influenced the community’s decision to accept or reject alternative water use.

Attitudes to alternative water use

The receptivity of the surveyed community to alternative water sources for irrigation was very strong (Table 2). For residents within the 50 metre buffer area this was 95%, and for those residents further away from the playing fields 92%, whilst for golf club members/players it was 100%. When asked if they had any concerns/objections towards alternative water sources being used to irrigation 89% of golf club members/players, 95% of residents near the playing fields and 90% of residents further a field reported that they had no concerns or objections with its use. Of the perceived concerns that respondents had with alternative water use, public health was ranked the highest at 34%, followed by impact on the environment (19%), practicality (15%), quality of the water (14%) and financial (14%) (Table 3).

Environmental appreciation

The responses to questions that were seeking insight into the environmental attitudes of the residents and golf club members/players indicate that the respondents have a strong concern towards environmental conditions and possible impacts. Overall 14% of the respondents perceived an environmental risk/impact might occur as a result of harvesting stormwater and reducing flows into the local creek system, a further 34% answering ‘maybe’. This ‘maybe’ response was generally dependent on the quantity of the water to be harvested indicating that the residential respondents are alert to the issues that might impact on the environment. Golf club respondents indicated that they saw no perceived risks to the environment in harvesting stormwater for irrigation, which is likely to be because the members/players would directly benefiting from its harvesting to irrigate the golf course.

Differences in opinion between residents and golf club members/players in relation to environmental concerns can also be seen in the question that asked the respondents to identify the top priority for stormwater management. While
both residents and golf club respondents indicated that overall harvesting for irrigation should be the top priority of stormwater management (50% residents, 78% golf club), residents had a stronger environmental response in that 20% believed that environmental issues should be top priority compared with only 11% from golf club responses. The residential response could be due their stronger association with the surrounding natural environment than the golf club members/players, who might live further away.

Receptiveness to recycled water

When respondents were asked if they would install and use rainwater tanks to supplement their current water supply, 54% of residents indicated that they would be willing to install a rainwater tank, with an additional 32% stating ‘maybe’, and 8% having already installed a rainwater tank. The positive response towards installing rainwater tanks could be further investigated by the local educators and authorities in Manly to determine why respondents willing to install a rainwater tank have not yet taken up the initiative. Respondents were also asked if they would accept the use of alternative water if their potable supply was under no restrictions with 86% indicating that they would still use alternative water, with an additional 9% responding maybe. This response indicates that the community will still be willing to use alternative water sources in the event that water restrictions are lifted.

Demographic changes in relation to alternative water source use

Po et al. (2004) identified that the demographic factors that might influence public perception of water reuse predominantly revolved around age and gender. However a study conducted by (Friedler & Lahav 2006) indicated that there was no correlation between demographic characteristics and the level of support for water reuse schemes. The results of this research revealed that in relation to acceptability, issues of concerns and objections with alternative water use age, gender, cultural background and education may have an influence on the perceptions of this community.

Age correlations

A statistical analysis of the data revealed that age was one of the demographic variables that changed in relation to the acceptability of alternative water use. Whilst all age groups expressed overall strong support, it was found that respondents aged between 36–45 years had a higher acceptability rating. However those in the above 56 years age group had the least concerns about water reuse. In relation to the issues affecting the use of alternative water those aged in the 46–55 and 56 plus age groups indicated that cost was a more important issue than health concerns, whilst this trend was reversed in the 26–35 and 36–45 years age group.

In a study conducted by McKay and Hurlimann (2003), there were also a number of strong trends observed between different age groups (18–30, 30–50 and over 51). Their

<table>
<thead>
<tr>
<th>Perceived issues of concern</th>
<th>Residents &lt;50 m of a playing field n = 19</th>
<th>Residents &gt;50 m of a playing field n = 386</th>
<th>Golf Club Members/Players n = 20</th>
<th>Average n = 425</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public health</td>
<td>26%</td>
<td>54%</td>
<td>37%</td>
<td>34%</td>
</tr>
<tr>
<td>Impact on the environment</td>
<td>21%</td>
<td>19%</td>
<td>–</td>
<td>19%</td>
</tr>
<tr>
<td>Practicality</td>
<td>21%</td>
<td>14%</td>
<td>13%</td>
<td>15%</td>
</tr>
<tr>
<td>Quality of the water</td>
<td>10%</td>
<td>15%</td>
<td>–</td>
<td>14%</td>
</tr>
<tr>
<td>Financial</td>
<td>21%</td>
<td>14%</td>
<td>37%</td>
<td>14%</td>
</tr>
<tr>
<td>Flooding</td>
<td>–</td>
<td>2%</td>
<td>13%</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
<td>2%</td>
<td>–</td>
<td>2%</td>
</tr>
</tbody>
</table>
McKay & Hurlimann (2003) observed that those in the 51 and over age group had the greatest opposition to water reuse schemes while those aged under 30 were more concerned about the environment. Unlike the McKay & Hurlimann (2003) study, this research found that those aged in the 19–25 years group were less accepting of alternative water use schemes and that environmental issues were of concern to all age groups. In relation to concerns/objections of alternative water use, those in the over 56 year group expressed the least concerns/objections whilst those in the 26–35 year group expressed the most concerns (Table 4).

The changed pattern of responses in this study compared to the McKay & Hurlimann (2003) study conducted in 2003 could be a result of the recent drought and water related media attention, in addition to education programs carried out since water restrictions were imposed in NSW in 2003. These programs could have given people a greater sense of awareness of the importance of conserving potable supplies by supplementing them with alternative water sources.

### Cultural background

The responses revealed that respondents of Non-English speaking backgrounds (NESB) had slightly lower acceptability towards alternative water use (Table 7) than those of English speaking backgrounds (ESB). However this demographic was under represented making up only 2.8% of the overall responses as people of NESB make up 11% of the overall population within the Manly LGA (Australian Bureau of Statistics 2002). Under representation of people of NESB indicated that there is a limitation in the analysis that can be undertaken with this demographic group.

### Gender

Although both gender groups expressed a strong response to the acceptability of alternative water sources (Table 5), males were more receptive towards its use than females. In relation to the issues that might affect the feasibility of alternative water use (Table 6), females ranked environmental issues overall higher than males (nevertheless health issues was the highest issue identified by both). Males also had slightly higher concern/objections than females; on the other hand females were more indecisive with their concerns towards alternative water use.

### Table 4 | Concerns/Objections with alternative water use

<table>
<thead>
<tr>
<th>Age</th>
<th>&lt;18yrs</th>
<th>19–25yrs</th>
<th>26–35yrs</th>
<th>36–45yrs</th>
<th>46–55yrs</th>
<th>&gt;56yrs</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>100%</td>
<td>–</td>
<td>12%</td>
<td>6%</td>
<td>3%</td>
<td>1%</td>
<td>3%</td>
</tr>
<tr>
<td>Maybe</td>
<td>–</td>
<td>100%</td>
<td>43%</td>
<td>87%</td>
<td>92%</td>
<td>94%</td>
<td>6%</td>
</tr>
<tr>
<td>No</td>
<td>–</td>
<td>–</td>
<td>8%</td>
<td>6%</td>
<td>5%</td>
<td>5%</td>
<td>91%</td>
</tr>
</tbody>
</table>

### Table 5 | Acceptability of alternative water sources for irrigation

<table>
<thead>
<tr>
<th>Gender</th>
<th>Males</th>
<th>Females</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>94%</td>
<td>90%</td>
<td>92%</td>
</tr>
<tr>
<td>Maybe</td>
<td>–</td>
<td>1%</td>
<td>0.5%</td>
</tr>
<tr>
<td>No</td>
<td>6%</td>
<td>9%</td>
<td>7.5%</td>
</tr>
</tbody>
</table>

### Table 6 | Perceived issues of concern

<table>
<thead>
<tr>
<th>Gender</th>
<th>Males</th>
<th>Females</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public health</td>
<td>40%</td>
<td>38%</td>
<td>39%</td>
</tr>
<tr>
<td>Impact on the environment</td>
<td>10%</td>
<td>15%</td>
<td>13%</td>
</tr>
<tr>
<td>Quality of the water</td>
<td>11%</td>
<td>8%</td>
<td>10%</td>
</tr>
<tr>
<td>Financial</td>
<td>38%</td>
<td>36%</td>
<td>37%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>
Education

Levels of schooling were found to influence the respondents’ acceptability levels. Those having only secondary schooling had a lower acceptability response than those that had tertiary schooling in relation to alternative water use (Table 8). Those with lower educational levels (years 9–12) indicated that cost was the highest issue that might affect the feasibility of alternative water use, whilst tertiary educated respondents indicated health issues as the highest. These findings are consistent with those of Hamilton & Greenfield (1991), which suggested that a person with a higher educational level was more likely to accept potable reuse.

Through a literature review of factors influencing public perceptions of water reuse Po et al. (2004) could not find any significant global relationship between gender and age in either the acceptance or rejection of water reuse across various studies. Similar to the results contained within this study each community had slightly varying concerns and objections towards alternative water use depending on a number of demographic variables. These results indicate that individual communities need to be assessed independently in order to correctly target the particular community concerns/objections towards alternative water use with educational programs/workshops.

CONCLUSION

The research findings identify very strong support for the use of alternative water schemes for irrigating both private (golf courses) and public urban playing fields in the Manly LGA. Results relating to individual respondents uptake of alternative water such as rainwater tanks indicates a positive awareness and willingness to use these sources of water.

The growing trend of the older generation now accepting alternative water sources, shows their awareness and knowledge of these water reuse schemes has increased. This is probably in part, due to the enormous media attention that water receives under the current drought conditions in Australia.

Overall, there is good news for local councils wanting to implement alternative water use schemes for irrigating urban playing fields, as it appears that communities are becoming more accepting of alternative water use. However, at the same time the community must be reassured that the water will meet the relevant health guidelines and that potential environmental impacts are taken into consideration when planning and implementing such schemes.

REFERENCES


| Table 7 | Acceptability of alternative water sources for irrigation |
|-----------------|-----------------|-----------------|-----------------|
| Cultural background | Yes | Maybe | No |
| English-speaking background | n = 378 | n = 378 | n = 378 |
| Yes | 92% | 0.5% | 7.5% |
| Maybe | 92% | 0.5% | 7.5% |
| No | 92% | 0.5% | 7.5% |

| Table 8 | Acceptability of alternative water sources for irrigation |
|-----------------|-----------------|-----------------|-----------------|
| Education level | Yes | Maybe | No |
| Secondary (Year 9–12) | n = 92 | n = 92 | n = 92 |
| Tertiary (TAFE/University) | n = 283 | n = 283 | n = 283 |
| Yes | 87% | 94% | 92% |
| Maybe | 1% | 0.5% | 0.5% |
| No | 12% | 5.5% | 7.5% |


