Identifying Social Attitudes and Barriers to Water Conservation – A Community Water Survey

H Lane¹, C Krogh², L O’Farrell³
¹Eurobodalla Shire Council, harvey.lane@eurocoast.nsw.gov.au
²Eurobodalla Shire Council
³Department of Environment & Water Resources

Abstract

In 2003, Eurobodalla Shire Council adopted its Integrated Water Cycle Management Strategy (IWCMS), which suggested that appropriate levels of Demand Management could be achieved through targeted customer rebate and community education programs. Whilst various education and incentive programs targeting water conservation had been previously run, it was felt they lacked a “documented” strategic approach, adequate monitoring and evaluation and any detailed knowledge of local people’s attitudes to and the level of uptake in the Community of various water saving devices.

Council therefore undertook a Community Water Survey in 2006. The survey was designed to identify the residential community’s awareness of water conservation issues, the level of adoption of various water conservation practices throughout the home and garden and the barriers preventing the uptake of any practices. This information can then be used to increase the effectiveness of any future education or incentive programs by ensuring they always target the most appropriate audience and message.

This paper outlines the approach taken to undertaking the survey and then discusses the strengths and weaknesses of the survey and the survey’s key findings which have implications for people designing community programs targeting various aspects of water conservation, including rainwater tanks.

Introduction

In April 2003 Eurobodalla Shire Council adopted its Integrated Water Cycle Management Strategy (IWCMS). The strategy ultimately aims to combine all aspects of water management and treat the system as an interacting whole, optimising use of water while minimising impacts to the environment. Inherent in achieving this is the reduced demand on potable water through both reduced consumption and the use of alternative water sources such as rainwater tanks, greywater reuse and effluent recycling. The means identified to achieve these goals included public education and incentive schemes for specific water saving devices. An ongoing budget was subsequently allocated for both education and incentive programs to ensure IWCMS goals would be met.

Incentive schemes for rainwater tanks, front loading washing machines and water efficient showerheads have been running since February 2005, with promotional and educational material developed to support these programs. Council has also run various education campaigns targeting water conservation since 1998, primarily as a reactive approach to drought conditions and increased water demand. Therefore there has been a lack of a “documented” strategic approach, adequate monitoring and evaluation and reporting of programs implemented.

It was therefore identified that an integrated approach to achieving Demand Management was essential which combined targeted education and incentive programs that overcome any barriers to uptake of desired activities with a detailed monitoring program that could adequately determine the success of each program.
To ensure current and future incentive and education programs are successful by achieving permanent behaviour change, an understanding of people’s current behaviours and the barriers preventing them from change and motivators driving them to change is essential. For example, an incentive program will only be successful if cost is the primary barrier preventing the uptake of a particular device AND there is otherwise willingness or acceptance amongst the Community to use the device AND there is currently a low uptake of the device. Additionally, the success of such a program can be increased if it can be identified which sectors of the Community are least likely to have such a device such that appropriate promotional campaigns can be run which target these people.

Further to this, having an understanding of how the Community’s awareness, attitudes and behaviours to water use and conservation differs between different demographics can maximise the impact of general education campaigns.

In order to gain the information discussed above, the Eurobodalla Community Water Survey was developed in early 2006. The survey design, distribution, data collation, data entry and analysis and reporting was undertaken entirely in house. Whilst this undoubtedly added extra time to the process, it drastically reduced the price and has provided a better understanding of the survey data for Council staff. In undertaking the process, other weaknesses of the approach taken were also discovered. The strengths and weaknesses of the methodology undertaken are discussed further in this paper.

**Methodology**

In development of survey questions a focus group and several community members (outside of the focus group) were consulted and a draft questionnaire forwarded for their contribution. Valuable feedback was provided and incorporated into the final questionnaire, assisting in ensuring the survey be as “user friendly” as possible, thereby increasing response rates.

The Eurobodalla Community Water Survey layout was designed to engage the reader within the first section of the survey, asking general questions to gauge practices around the home. The second “demographics” section was purposely placed towards the end of the survey as this information, although important, could possibly have deterred readers from completing the survey if placed at the beginning.

The survey questions were designed to categorise participants according to age, sex, residence type, population, approximate pre-tax income and household situation. This was done so as to allow for a demographic analysis of survey participants as a comparison to the entire Community, as well as to assist in identifying specific behaviours and awareness of certain individuals, sub groups and groups.

The survey was sent out with water bills with reply paid envelopes, along with being made available on Council’s website. To encourage survey completion a prize of up to $700 off water and sewer base charges or alternatively a 3-day houseboat holiday was offered. Approximately 16,500 surveys were distributed, with 2,168 returned.

The total cost to Council of undertaking the survey was approximately $11,000, which included employing contractors to undertake data entry, printing, advertising, reply paid envelopes and the prize. Considerable staff time was also required for developing the survey
and analysing and reporting on the data. In comparison, a 12 or 15 minute phone survey of 400 residents would have cost Council approximately $16,000 or $20,000.

Accuracy of the Survey

Any type of survey method chosen, whether mail out, telephone or face-to-face, has different limitations and strengths. The most suitable method to use depends on the actual objectives of the survey and the resources available. Most important in choosing a survey method is ensuring the accuracy of the survey. Surveys can only yield accurate results by eliminating four kinds of errors. (Salant & Dillman, 1994). These kinds of errors and their relevance to the Community Water Survey are discussed below.

Coverage error
Coverage error occurs when the list from which a survey sample is drawn does not include all elements of the population that researchers wish to study. Mailing the survey out with water bills therefore substantially reduced the potential for coverage error. However, potential sources of coverage error come from missing those residents that are connected to town water that do not receive water bills, ie renters and people living in strata title units. To ensure these residents were aware of the survey and to encourage their participation, thereby ensuring coverage error was minimised, the survey was also made available on the Internet, with the survey and the prize widely promoted in local media and through local real estate agents.

Sampling error
Sampling error occurs when only a subset or sample of all people in the population is surveyed. Given the survey method chosen of mailing out with all water bills, this error source is not applicable.

Measurement error
Measurement error occurs when a respondent’s answer to a given question is inaccurate or imprecise, or cannot be compared in any useful way to other participants’ answers. Mail surveys are often less prone to measurement error as they are less sensitive to biases introduced by interviewers as well as the tendency for participants to give answers they think the interviewer wants to hear. (Salant & Dillman, 1994). However, this will only be the case if clear, concise questions are asked that cannot be misinterpreted by the respondent. This was considered carefully when preparing the survey questions, and the focus groups were then used to ensure people from different backgrounds easily understood all the questions.

Another potential weakness of the type of survey chosen was the lack of ability to follow up on survey responses for the purpose of clarification where a response is not considered clear. Analysis of the results showed that whilst the majority of survey answers were done with sufficient clarity to meet the survey objectives, numerous surveys where filled out incorrectly or not completed, ultimately affecting the data. Therefore, whilst sufficient responses were received to ensure meaningful results were obtained, an alternative survey methodology that allowed for follow up of survey participants to clarify ambiguous responses would have helped entirely eliminate this source of error.

Non-response error
Non-response error occurs when a significant number of people do not respond AND are different from those who do in a way that is important to the study. One advantage of mail surveys in addressing non-response error is that they can provide anonymity to the
respondent. However, the inclusion of a prize to try and overcome potential non-response error required participants give their personal details (name, address and phone number), thereby potentially negating the benefit of anonymity. Additionally, the respondent’s water meter number was required to ensure the survey was valid and to ensure multiple entries from one person were not submitted. Each of these could have affected the response rate, however, the offer of a prize was used to help overcome this and maximise the response rate from all sectors of the community.

Given the high response rate of over 2000, the amount of responses is not immediately considered a weakness of this survey. However, one of the main weaknesses of a mail survey is that some people are less likely to respond to the questionnaire than others are, thereby increasing the risk of non-response error. One of the main concerns with the survey method chosen was that it might attract responses from people who are already concerned about the environment and/or water conservation. People who receive mail questionnaires have the opportunity to examine it before deciding to respond and their interest in the topic can affect this decision. (Salant & Dillman, 1994).

Another problem limiting the response rate to the surveys may be people unable to read, follow seemingly complex instructions or provide written answers. Ensuring the response rate adequately represented the demographics of the Shire in regard to housing and family type, age group and income was essential in obtaining accurate and meaningful information. The use of questions to categorise behaviour in relation to environmental issues other than water conservation, and categorise participants in relation to demographics and water use was done to allow an assessment of the degree of non-response error. Comparisons of survey participants versus 2001 Census data for each demographic category was therefore undertaken to assess the degree of non-response error for this survey. The results of this analysis are summarised below:

- Of the total participants, 63% indicated that they either use a compost system or worm farm, 54% use energy efficient light globes, 13% use green electricity, and 7% use solar hot water. The large proportions of participants who do not do one or a number of these relatively common environmental activities in their home indicated that the survey participants are not overwhelmingly those actively concerned about or engaged in environmental issues or activities.
- The majority of age groups in the Shire were found to be adequately represented in the Survey participants. The only age group considerably under represented were 18 to 24 year olds. This was not unexpected, nor considered extremely important, as the 18 to 24 age group is the smallest in the Shire (4.15%) (Australian Bureau of Statistics), and many people of this age may still live with their parents or likely renting, and therefore may not have been appropriate for or aware of the survey. Therefore, results for the 18 to 24 year age group were therefore not considered for the remainder of the survey analysis. 55 to 64 year olds were also over represented.
- Housing type, when broken down into house, townhouse or unit/apartment/flat, and permanent residential or holiday house, were adequately represented in the survey participants. However, the proportion of participants who are renters was 5.45%, compared to 22% for the Shire (Australian Bureau of Statistics), showing that this demographic is under represented. The under representation of renters was somewhat expected due to the method of survey distribution.
- All family/household types were adequately represented in the survey participants.
- Low income earning households (less than $20,000/year) were significantly under represented in the survey participants, whilst households earning over $100,000/year were slightly over represented. However, a large amount of participants chose not to nominate their income on the questionnaire (22%), compared to only 4% in the 2001 Census (Australian Bureau of Statistics).

To ensure survey participants also adequately represented the community in terms of their water conservation, an analysis of the water consumption of the participants by suburb was compared to the actual average water consumption for that suburb. The results showed that for the majority of suburbs, the water consumption of the participants was very close to the actual average, with 18 of the 31 suburbs having participants’ water consumption being within 10% of the average. Only participants from 6 suburbs consumed considerably less than average (28 to 51%). It is therefore considered that given the high amount of responses and the favourable comparison regarding water consumption that the survey participants accurately represent the water consumption habits of the general Eurobodalla community.

**Survey Results**

A total of nineteen questions were asked in the survey to categorise participants’ knowledge and understanding of water use issues and their commitment to water conservation.

The results of the survey showed that participants had a good understanding of the amount charged for water and how water is used throughout the home. However, despite claiming to be concerned about the health of local waterways, there was a surprisingly poor understanding of the nature of the Council’s water supply system and the fact that the majority of Council’s water is sourced from the Moruya or Tuross Rivers. It was also noted by participants that the biggest motivation to save water was to save money. Therefore, raising people’s awareness of the nature of Council’s water supply, in conjunction with other education and incentive programs, could assist in achieving greater levels of water conservation in the Community.

Various positive aspects of people’s behaviour were highlighted by the survey results. These include the proportion of participants who claim to water their garden “as little as possible” (47%) and the high proportion (over 70%) who regularly use mulch and hand held hoses. Another interesting result in relation to outdoor use was that people with mostly lawns in their garden claim to water very little, going against the perception that those with expansive lawns are generally water wasters. These observations demonstrate that people are at least aware of and hopefully adopting some of the standard outdoor water minimisation practices promoted during the recent periods of drought and water restrictions. These claims have to a certain extent been validated in recent demand analysis studies, which indicate a 50% reduction in outdoor residential water use since 2002.

Additionally, there is a high proportion of participants (74%) who have dual flush toilets, wait until they have a full load before washing clothes (57% always, 36% sometimes) and check the water efficiency label of appliances/fixtures before buying (92%).

Despite the positive aspects noted above, there is still a relatively high proportion of participants (37%) who water their gardens on a regular basis (weekly or greater). The most likely gardeners to be watering regularly are those with exotic flower gardens, palm trees, vegetable gardens and fruit trees. Additionally, there was only a moderate uptake of various water saving practices in the garden such as reducing/replacing high water use gardens, using
rainwater or greywater and using soil enhancers/wetting agents, and a low uptake of water efficient irrigation systems and tap timers. Interestingly, 25 to 34 year olds were least likely to install water efficient irrigation systems despite being most likely to water every second day. The barriers for not adopting these practices, from highest to lowest, are demonstrated in Table 1 below. These facts combined demonstrate that there are still improvements to be made in outdoor water use in the residential sector and programs that overcome the identified barriers would be beneficial in achieving these improvements.

Table 1: Barriers for not implementing external water conservation practices

<table>
<thead>
<tr>
<th>Garden Water Conservation Practice</th>
<th>Major barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducing lawn</td>
<td>Cost, not visually pleasing, too time consuming and not considered effective</td>
</tr>
<tr>
<td>Replacing lawn/high water use</td>
<td>Cost, not visually pleasing, too time consuming and not considered effective</td>
</tr>
<tr>
<td>garden species with low water</td>
<td></td>
</tr>
<tr>
<td>use garden species</td>
<td></td>
</tr>
<tr>
<td>Rainwater tanks</td>
<td>Cost</td>
</tr>
<tr>
<td>Using soil enhancers/wetting</td>
<td>Cost, not effective, need more information</td>
</tr>
<tr>
<td>agents</td>
<td></td>
</tr>
<tr>
<td>Greywater recycling</td>
<td>Cost, too time consuming and not user friendly</td>
</tr>
<tr>
<td>Drip/trickle/sub surface</td>
<td>Cost, not effective</td>
</tr>
<tr>
<td>irrigation systems</td>
<td></td>
</tr>
<tr>
<td>Tap timers</td>
<td>Cost, not effective</td>
</tr>
</tbody>
</table>

With respect to internal use, there was only a moderate uptake of water saving practices such as using water efficient showers and tap aerators, and a low uptake of front loading washing machines, greywater recycling, rainwater use and hot water circulation systems. The barriers for each of these are also shown in the Table 2 below. Whilst it is obvious that once again programs designed to overcome the barriers below would be beneficial, of particular note are the barriers for not installing water efficient showerheads and rainwater tanks, combined with a low awareness of Council’s current incentive schemes for these devices. This suggests that a combination of increased promotion, public education on the performance of showerheads, and increasing the value of the rainwater tank rebate could increase the effectiveness of these programs.

Table 2: Barriers for not implementing internal water conservation practices

<table>
<thead>
<tr>
<th>Internal Water Conservation Practice</th>
<th>Major barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water efficient shower</td>
<td>Will consider when it’s time to replace, cost, not effective, need more information</td>
</tr>
<tr>
<td>Tap aerator</td>
<td>Need more information, cost, will consider when it’s time to replace</td>
</tr>
<tr>
<td>Front loading washing machine</td>
<td>Don’t have a washing machine, will consider when it’s time to replace, cost</td>
</tr>
<tr>
<td>Grey water recycling</td>
<td>Cost, need more information</td>
</tr>
<tr>
<td>Rainwater tanks</td>
<td>Cost</td>
</tr>
<tr>
<td>Hot water recirculation system</td>
<td>Need more information, too costly.</td>
</tr>
<tr>
<td>Single flush toilet with water</td>
<td>Don’t have a single flush toilet (ie have dual flush), will consider when it’s</td>
</tr>
<tr>
<td>saving device</td>
<td>time to replace, cost</td>
</tr>
</tbody>
</table>
Additionally, the survey results showed that approximately half of the participants would have their household members, on average, shower for greater than 5 minutes, with 37% showering for 5 to 7 minutes, demonstrating that collective water savings could be made by reducing these times across the Community. Participants aged 25 to 54 and families with children and young couples without children are the most likely to take longer showers.

There was also a high proportion of participants unaware of Council’s existing rebate schemes and their Permanent Water Conservation Measures, despite ongoing promotions by Council.

**Conclusions**

By choosing to mail surveys out with water accounts, and offer a prize as an incentive for participation, an excellent response of 2168 out of a total of approximately 16,500 water accounts was achieved. Analysis of the demographics of the survey participants showed that a good representation of the Community in terms of age, housing type, family/household situation, income and water consumption was achieved. The only significant under representations were renters and low income households earning less than $20,000/year. Therefore, the results of the survey can be seen as valid and useful for providing direction for future campaigns promoting water conservation to the residential sector.

The use of an alternative survey methodology could have increased the accuracy of the survey results by ensuring the under representations mentioned above, and measurement error through ambiguous responses, were minimised. However, this would have come at a greater cost to Council and with a reduced amount of survey participants.

Whilst undertaking the development, distribution and analysis of the survey entirely in house took considerably more staff resources than out sourcing it, it provided numerous benefits such as a much greater cost effectiveness for the amount of participants reached and a detailed understanding of and access to all survey results by Council staff.

The results of the survey were able to highlight various positive and negative aspects of Community awareness and behaviour regarding water consumption and conservation. The variability in this awareness and behaviour in terms of demographic has also been demonstrated. The results of this survey can therefore be used to assist in determining what aspects of water conservation should take higher priorities in any future programs and how the effectiveness of these programs can be maximised in terms of program design, target audience and communication. This will help in ensuring that potential water savings are maximised for every dollar spent. It is important to note however that in designing programs, the survey results should be used in conjunction with ongoing monitoring of water demand and uptake and effectiveness of any existing Council demand management programs.

Other Councils or Water Authorities relying on the success of achieving certain levels of demand management through education or incentive programs as a means of ensuring sustainable supplies into the future are recommended to undertake a similar process such that success of these programs is maximised.

**References**