

State of the
Environment
Reporting Series

Technical Paper No. 3

**Measuring Community Attitudes and Behaviours in State of the
Environment Reporting: Development of a Community
Inventory**



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Foreword

The Environmental Protection Authority (EPA), on behalf of the State Government, is responsible for overseeing the State of the Environment (SoE) Reporting process. The draft 2006 SoE report has been released and will be finalised in 2007. The EPA is an independent environmental advisory body, and has welcomed the responsibility of coordinating the 2006 State of the Environment Report. The EPA is keen to engage the WA community and its stakeholders in such an important task and has established a number of processes to provide input into the development of the 2006 SoE Report and inform future SoE reporting. To this end, the EPA has invited experts to prepare technical papers on specific matters related to SoE. These papers are being released to the community as part of the SoE Reporting Series.

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Contents

	Foreword	1
	Acknowledgements	1
1.0	Introduction	3
2.0	Methodology	3
2.1	Background	3
2.2	Proposed structure and pre-testing of the questionnaire	7
2.3	Example questions	8
2.4	Questionnaire administration	9
2.5	Non-participation data	9
3.0	Results from the survey	10
3.1	Assessing whether locality demographics or overarching ethics have an influence on environmental attitudes and behaviours	10
3.2	Frequencies of response to each question	11
3.3	The relationship between variables	20
3.4	Simple regression analysis of the proposed model	22
4.0	General and specific comments on the questions	24
4.1	Friends or neighbours?	24
4.2	Improvement of questionnaire structure	24
4.3	Overcoming perceptions of length	24
4.4	Specific comments	24
5.0	The recommended WA community state of the environment inventory	25
5.1	Procedural details	25
5.2	Inventory content	25
5.3	WA community state of the environment inventory	26
6.0	References	31
7.0	Appendices	31

1.0 Introduction

This technical paper provides information about a proposed model for measuring community attitudes, values and behaviours in State of the Environment (SoE) reporting. The State of the Environment Steering Group, who provided guidance in the development of the SoE report, identified the need for measuring and benchmarking social and behavioural variables in SoE reporting. Including measures of community, values, beliefs, attitudes and behaviours in SoE reporting is a highly desirable objective as it is ultimately these factors that will to a great extent determine the future condition of the Western Australian environment.

Society's attitudes have been monitored in the past by government authorities but often on a spasmodic basis and without the benefit of a systematic theoretical approach to the activities. Public perceptions of the quality of various aspects of the environment have also been measured as an adjunct to biological and physical indicators (e.g. Hughey, Cullen, Kerr and Cook, 2004).

In general varying but often high levels of attitudinal support for environmental issues have been recorded in "representative" samples of the population. There have also been records taken of reported behaviour both in formal State of Environment surveys and environmental psychological studies. The problem with this approach is that the attitudes and behaviours measured have been topical and there has been little or no theoretical basis for measuring change.

In this technical paper, the development and testing of a model that overcomes these limitations is reported. The model is used to create an instrument that can provide reliable ongoing measurement of community values, attitudes and reported behaviour in relation to environmental issues. The approach taken draws upon basic values, attitudes and behavioural theory that have been modified to create a succinct but pragmatic instrument.

2.0 Methodology

2.1 Background

To date, the inclusion of social and behavioural variables in SoE reporting has generally been restricted to representative surveys of reported behaviours or attitudes. The problem with such surveys is that reported behaviour does not necessarily reflect what actually occurs and there is often a high degree of agreement shown to environmentally positive attitudinal statements. This approach creates problems in interpretation of survey results and makes it difficult to demonstrate improvement or change over time. For example, a national study by CSIRO (Nancarrow et al, 1998) on stormwater showed that if reported household behaviour to protect stormwater quality was in fact being undertaken, the stormwater problems identified by local shire councils should not have occurred.

The methodology proposed in this paper outlines an attitude-behaviour model that takes a systematic approach to measuring environmental attitudes and behaviours to enable the path of improvement leading to behaviour change and behaviour change itself to be measured over time.

A further important issue for consideration, arising from environmental psychology research, is that the relationship between community attitudes and behaviours towards the environment are likely to be heavily influenced by the environment in which they are expressed. That is, those variables that are important in affecting social and behavioural responsiveness to environmental issues are likely to vary in different parts of State (e.g. the northern suburbs of Perth compared with a town in the Kimberley or a wheatbelt town). Therefore the collection of a representative statewide sample of respondents to a SoE survey is likely to have very little meaning. Progress is better measured by selecting

a series of “icon” environments representing the range of environments and communities in Western Australia.

The methodology proposed employs an “icon” approach to account for the influence of local environmental factors on environmental attitudes and behaviour. The model includes all the basic variables that have been repeatedly demonstrated to be significant in predicting conservation behaviour. A literature review was conducted to identify all the major variables and these are shown in Table 1. From Table 1, it can be seen that a wide range of personal and social variables have been shown to have some relationship to environmentally responsible behaviour.

Table 1. Variables shown to be significant in predicting environmentally responsible behaviour (see Appendix 1 for references used to arrive at this list).

Potential Variables	Behavioural Intention	Behaviour
Objective Knowledge Self Efficacy/Control Interest Moral Norm Beliefs Attitudes - Centrality Altruism - Actively Caring Personal Responsibility Social Norm Connectedness Spatial Identity/ Place Attachment Local Culture Cultural Identity Perceived Behavioural Control Personal Susceptibility (Optimism Bios) Individual Skills /Commitment/ Competency (Skills & Personal Viewpoint) Group Cohesion/Numbers Degree of conflict Chance for Social Cohesion Trust /Procedural Justice in Decision Making Public Commitment Disposable Income Willingness to Pay Community Support Corporate Commitment Local Government Support State Government Support Federal Government Support NGO Support	Income Difficulty of Solution Age Impediments to performing behaviour	Reported Behaviour

It may be noted that hypothesised functional relationships between the variables are not represented above. Nevertheless Table 1 does give us a strong indication of the pragmatic requirement for an adequate yet simple model.

The elements of the model are outlined below.

- A) Select a (or several) simple indicator(s) of *conservation behaviours*, such as the amount of recycling, energy consumption or water consumption. The indicator/s chosen should, as far as possible, be commensurate between the different icon sites (ie we need a set of indicators that have the same meaning across sites). For

example, it is pointless measuring public transport usage as a common indicator if access to public transport is vastly different between sites.

- B) Derive a reported conservation behaviour technique that has a common metric and can compare between sites while also accounting for differences in individual patterns of behaviour that are mediated by the local environment. The reported conservation behaviour technique should be able to measure performance and demonstrate improvement in a comparable way between the differing icon sites.

The technique recommended here is the Rasch scaling technique. The Rasch scaling technique has been used in its simplest form by Kaiser et al (1999) for reported environmentally relevant behaviour and by Waugh (2003) in a more comprehensive educational application. In using the Rasch scaling technique Kaiser et al (1999) created a General Ecological Behaviour Scale. Each of the behaviours on the scale is rated for its difficulty to be carried out, which represents an aggregate estimate of all the constraints beyond people's control. The level of difficulty for each behaviour is estimated by considering the number of people who behave correspondingly. The tendency of an individual to behave environmentally responsibly is estimated by considering the number of environmentally responsible behaviours he or she has carried out (ie the probability that somebody will behave environmentally responsibly given that behaviours have varying levels of difficulty).

Some testing is required to establish if this approach is appropriate in Western Australia but some studies have been conducted on self reported conservation behaviours for water and electricity in WA that will assist in developing such a scale.

- C) Include measurements of attitude toward the completion of conservation behaviours (e.g. see Ajzen, 1988).
- D) Include a measure of beliefs about performing conservation behaviours (e.g. see Ajzen, 1988).
- E) Select a simple scale of intrinsic or personal motivation that can demonstrate changes in the level of personal commitment. In this application this variable is measured in terms of the degree of personal emotion aroused by environmental events (Grob, 1995).
- F) Include a simple measure of "subjective norm" that demonstrates the change in the level of community commitment.
- G) Include selected social or "capacity" indicators (such as measurement of membership of local conservation groups).
- H) Assess what, if any, knowledge indicators may be useful.
- I) These relationships between all of the variables should be causally modelled to establish the SOE framework.

Given the methodological requirements it is clear that it is desirable to gather information on reported behaviour for a wide range of conservation behaviours, it would be impossible to gather enough information from householders to model them all. For this reason three behaviours have been selected that are likely to be relevant to people in all locations in Western Australia. They are domestic water conservation, domestic energy conservation and activities that will protect local waterways through protecting the quality of stormwater. Information on other environmentally related behaviours has been limited to reported behaviour only.

It must also be acknowledged that all of these variables must be measured in a simple instrument that can be administered within a reasonable time period and by telephone. Alternatives to a telephone survey are not ideal. For example, mail surveys commonly receive low response rates and personalised 'drop and pick up' techniques, are difficult to conduct in Western Australia due to the large area of the state and distances between some respondents.

The proposed model is shown in Figure 1. It can be seen that behavioural intention has not been included as a variable as may have been expected from Table 1 as it pertains to future rather than current behaviour. As such, the attitudinal variable relating to the enjoyment of performing a given behaviour was selected as it is a more pragmatic variable for an ongoing monitoring program. Overarching ethics, although they were not reliably identified in the literature search nor in our initial review of the basic requirements listed above, were also included, as they have been found to be influential in affecting voting behaviour in WA (Lumley and Marion, 2000) and in acceptance of water reallocation for environmental purposes (Syme, Nancarrow and McCreddin, 1999).

The model follows some commonly held hypotheses in a number of attitude behaviour theories identified during our review. The arrows represent the supposed relationship between the variables, those at the base of the arrow tend to have an influence on those at the tips of the arrows. Those with double headed arrows are assumed to be correlated. Some but not all of the relationships are described below.

From this figure it can be seen that essentially beliefs about behaviours are closely related to attitudes to perform them and their eventual performance, sometimes social desirability are closely related attitudes as well. People can tend to tell you what they think you expect to hear. Subjective norms (or what you think others will want you to do) can affect beliefs about a behaviour and indirectly your attitudes towards it. Subjective norms can also affect behaviour directly. Intrinsic Motivation or feeling good about performing a behaviour can lead directly to performing that behaviour. The final causal chain that is worthy of note is that from ethics through values to behaviour. In general ethics (in the developed model called overarching values as ethics only relating to the environment were chosen) relate to the long term feelings about what sort of society one would like to see. Values are generally regarded as long term personal preferences one would hold in regard to the environment. Finally attitudes are more specific and are held in regard to specific environmental behaviours. It is assumed that the ethics or generalised values lead to personal long term values for environment which then tend to predict attitudes and subsequently behaviour.

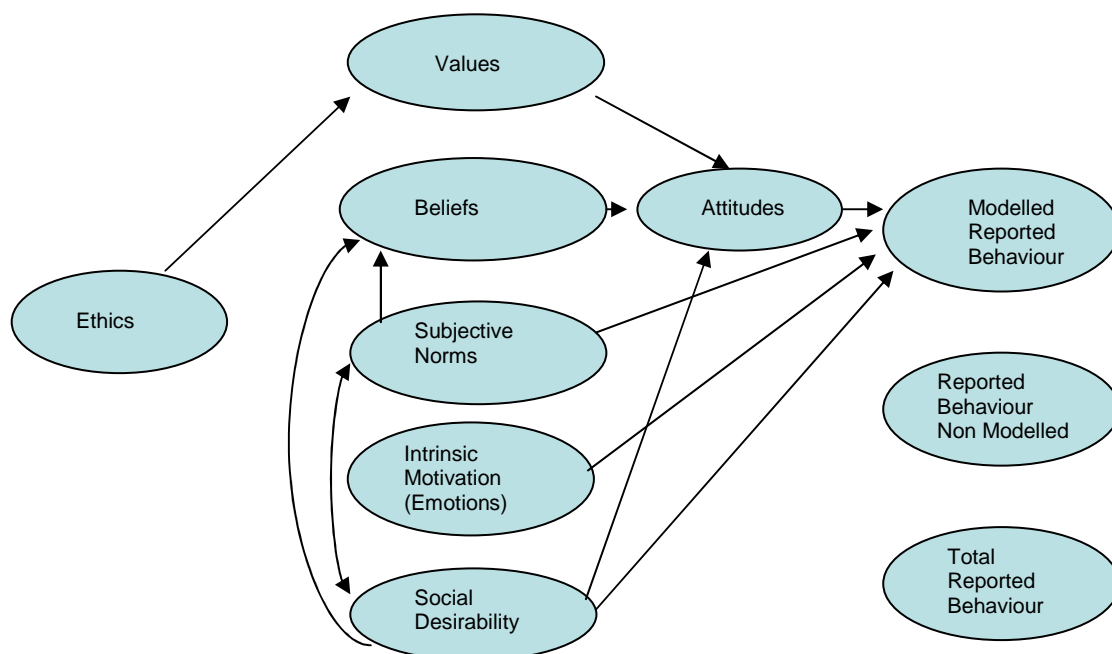


Figure 1. Initial Model for State of Environment Reporting.

2.2 Proposed Structure and Pre-testing of the Questionnaire

The details of the proposed structure of the questionnaire are shown in Table 2. The structure was chosen to enable enough data to be collected to test the model adequately

but also make it feasible to conduct via telephone and within a reasonable time period. The complete questionnaire was first reviewed and revised by the interview team at CSIRO. The revised questionnaire was later pre-tested with 50 randomly chosen community members in each of two WA locations: the suburb of Hamersley in metropolitan Perth and the rural township of Merredin in the WA wheatbelt. The interviews were conducted by Coakes Consulting who provided independent feedback on possible revisions to the questions.

The pre-test was conducted to identify problems with questions in terms of ease of understanding and presentation, and to establish whether the length of the questionnaire could be accommodated within a reasonable time period for the respondents. In addition, the pre-test size of 100 was large enough to enable reasonable trial analyses to be undertaken to establish the feasibility of the model. The contents of the pre-test questionnaire are provided in Appendix 2.

Table 2. Proposed Structure of Questionnaire 2

Part 1 Overarching Values	Part 2 Environmental Values	Part 3 Conservation Beliefs	Part 4 Conservation Attitudes	Part 5 Subjective Norms	Part 6 Emotions	Part 7 Reported Behaviours Modelled	Part 8 Reported Behaviours	Part 9 Demographics	Part 10 Actual Behavioural Measures
Stewardship & Responsibility Economic Values Societal Aspirations Intergenerational Issues Environmental Ethics	Household Water Household Energy Land & Waterways Conservation	Household Water Household Energy Land & Waterways Conservation	Household Water Household Energy Land & Waterways Conservation	Household Water Household Energy Land & Waterways Conservation	Household Water Household Energy Land & Waterways Conservation	Household Water Household Energy Land & Waterways Conservation	Heritage Transport Biodiversity	Household Type Age Group Membership Length of Residence Education	Water Consumption Energy Consumption Landsat Data
Up to 15 Items	Up to 15 Items	Up to 15 Items	3 Items	6 Items	6 Items	7 Items each (21 Items)	5 to 9 Items (such as suggested for Transport)		

2.3 Example Questions from the first draft questionnaire

Each Question has been assigned a seven point scale so that the respondents can indicate their level of agreement or disagreement with statements. Example statements are provided below, with a focus on the household water topic in relevant parts.

Part 1 Overarching Values

Saving our environment for the future is more important than profiting now.

The natural environment has the same right to consideration as people have.

There are no general rules for environmental management it depends on the situation.

Environmental resources should be allocated to maximise the overall economic return to the community.

Looking after the environment is important for our long term survival.

There is no relationship between the economy and the natural environment.

Part 2 Environmental Values

Please tell me how important each of these is as a guiding principle in for you (if you are opposed to these statements, please tell me as well):

- Protecting the environment, preserving nature
- Unity with nature, fitting into nature
- Respecting the earth, harmony with other species.

(Stern et al, 1995)

Part 3 Conservation Beliefs

If I save much more water my lawn or garden will die.

I feel its my duty as a responsible citizen to save as much water as possible.

I am already saving as much water as possible.

If I save water it will mean that there is less chance of future water restrictions.
The amount of money I would save on my water bill by conserving water is important to me.

Part 4 Conservation Attitudes

If I save more water this year than last it will be:

- (i) extremely good to extremely bad
- (ii) extremely favourable to extremely unfavourable
- (iii) extremely beneficial to extremely harmful.

Part 5 Subjective Norms

Most of my family think I should save water.
Most of my friends think I should save water.

Part 6 Emotions

It's good to see more people saving water.
I save water because it feels right.

Part 7 Reported behaviours

I usually sweep rather than hose concrete or paved areas.
I often hand water the lawn.
I have reduced the area for lawn.
I always fix dripping taps and hoses.
I use a washing machine that uses less water.
I have installed a timer for showers.
(Perth Domestic Water Use Study)

Part 8 General Reported Behaviours

I have visited a heritage building last year.
I have used my car more this year than last year.
I have visited a national park in the last year.
I have contributed to groups trying to retain our variety of native animals and plants.
I have used less chemicals and fertiliser on my land this year.
I am a member of a conservation group.
No matter what I do personally my actions won't affect air pollution.
I sometimes tip household waste down the street drain.

Part 9 Social Desirability

I would always rather "do without" than do something that degrades the environment.
Domestic water and electricity conservation are the most important concerns in my life.
The most enjoyable activity in my life is helping to protect our waterways.
I have never wasted a drop of water.

The questionnaire that was pre-tested with the public is provided in Appendix 2. It may be noted that some of the questions were altered after a preliminary pre-test with experienced interviewers from the CSIRO field team before the telephone interviews. This is particularly evident in the conservation attitude questions.

2.4 Questionnaire Administration

A database of 200 households was generated across the two survey areas and used to make contact with respondents. Every fourth person on the database was contacted to ensure that random recruitment and consistent sampling and administration techniques were applied in both Merredin and Hamersley. In contacting households, a uniform introduction regarding the purpose of the survey was applied and participation sought

(refer to Appendix 3 for script). Participants over the age of 16 were invited to participate. Potential participants were deemed non-contactable when they were contacted four times over four days at different hours with no response. If participants stated that they were too busy at the time of the call, they were asked if they would like to be contacted at a different time. If so, a time for the interview was arranged that would be appropriate otherwise further contact was terminated. Generally, no messages were left on participants answering machines.

Two social scientists were employed to conduct the surveys. If the contacted person agreed to participate, the interviewer worked through the questionnaire with the participant. The average call duration was approximately ten minutes. The response rate for Merredin was 25% and the response rate for Hamersley was 24.5%.

2.5 Non-participation Data

The two sample communities provided a contrast in their frequency of non-participation. Of potential participants in Merredin, 68 of the 200 people listed refused outright to participate. In comparison, 109 of the 200 refused outright to participate in Hamersley. Despite this, the reasons for non-participation were generally quite consistent across the communities sampled. Non participation was primarily due to disinterest in the topic, followed by being too busy (e.g. with children, with work, with household duties, social activities, were about to go out). Other reasons included participants being ill at the time of the call, having hearing difficulties, and remarks that the survey would take too long to complete. There were several participants who stated, as their reason for non-participation, that English was not their first language.

3.0 Results from the Pre-test Survey

It is not possible to provide a full test of the model from the number of responses in the pre-test. Nevertheless, it is a sufficient number to establish whether the relationships expected have occurred between differing variables and to test whether reliable results have been obtained from scales that should be correlated.

In this brief analysis there will be four sections:

1. An assessment of whether locality demographics or overarching values have an influence on environmental attitudes
2. A descriptive analysis of the response to each question. This section also includes information on actual consumption rates of water and energy in each site.
3. An analysis of the relationship between variables
4. A simple regression analysis of the hypothesised model

These analyses, along with comments from the community and Coakes Consulting, will be used to develop a revised questionnaire for the model. Qualitative analysis of the respondents comments in relation to the questionnaire are shown in Appendix 5.

3.1 Assessing whether locality demographics or overarching ethics have an influence on environmental attitudes and behaviours.

The means on all measures were compared and contrasted for location (Merredin versus Hamersley), age, education level, income, household ownership and very few differences emerged. There were no significant differences when multivariate statistical tests were used. However, there was a tendency for those few people who reported that they were members of a conservation group (six in all) to report performing more environmentally responsible behaviours.

The overarching values questions were subjected to a cluster analysis to establish whether there were patterns of 'ethics' within the community. Two highly differentiated clusters emerged. The first cluster, comprising about 46% of the sample, tended on the six questions to:

- agree more that it was better to save the environment for the future rather than profit now;
- agree more with the concept of environmental rights;
- disagree more with the statement that we should make as much money out of natural resources as we can;
- agree there was a relationship between the economy and the environment;
- disagree more that planning shouldn't have general rules; and
- consider that good environmental management was necessary if humans were to survive.

It is important to note that the mean differences between the two groups were significant. Those in the second cluster were more neutral in their attitudes towards these issues rather than opposed them.

There were no obvious demographic differences between members of the two clusters. Nevertheless there were other systematic differences. Those in cluster one had statistically significant higher levels of environmental values, stronger emotional attachment to the environment, stronger pro-conservation attitudes and beliefs, as might be predicted from the model. It is interesting however, that there were no significant differences in reported pro-environmental behaviour or in the scale that measured the tendency to provide socially desirable responses. Thus the benefit of measuring values, attitudes and beliefs as well as reported behaviour to provide ongoing monitoring seems to be vindicated. It is also encouraging that a coherent pattern of responses that align with the model has emerged.

3.2 Frequencies of response to each question

3.2.1 Overarching values

Overall, respondents in the study held positive attitudes towards the natural environment. The results for the overarching values questions are shown in Table 3. The vast majority agreed or strongly agreed (>80%) that *the natural environment has the same right to consideration as people have; saving our environment for the future is more important than profiting now; and that looking after the environment is important for our long term survival.* Most (71.8%) disagreed or strongly disagreed with the statement *there is no relationship between the economy and the natural environment.*

Table 3: Summary of responses for questions relating to overarching values.

Statement	1 Strongly agree (%)	2 Agree (%)	3 Neither (%)	4 Disagree (%)	5 Strongly disagree (%)	Mean
There is no relationship between the economy and the natural environment	1.0	14.1	13.1	56.6	15.2	3.71
We need to make as much money out of our land and water resources as we can	4.0	31.3	13.1	44.4	7.1	3.19
There are no general rules for environmental management it depends on the situation	3.0	59.6	9.1	26.3	2.0	2.65
The natural environment has the same right to consideration as people have	24.2	64.6	4.0	6.1	1.0	1.95
Saving our environment for the future is more important than profiting now	37.4	56.6	4.0	2.0	-	1.71
Looking after the environment is important for our long term survival	37.4	60.6	-	1.0	1.0	1.68

3.2.2 Environmental values

Respondents in the study displayed strong environmental values. The vast majority (>80%) agreed or strongly agreed with the statements relating to environmental values (see Table 4).

Table 4: Summary of responses for questions relating to environmental values.

Statement	1 Strongly agree (%)	2 Agree (%)	3 Neither (%)	4 Disagree (%)	5 Strongly disagree (%)	Mean
It's important for me to feel I am fitting in with nature	15.2	74.7	4.0	6.1	-	2.01
For me it's a matter of principle that we should try to live in harmony with other species	25.3	70.7	1.0	3.0	-	1.82
Protecting the environment and preserving nature is an important guiding principle for me	28.3	69.7	-	2.0	-	1.76

3.2.3 Conservation beliefs

The results for questions relating to conservation beliefs are summarised in Table 5.

Water

On average, respondents indicated a strong sense of responsibility towards saving as much water as possible. Nearly all the respondents (97.0%) felt it was their duty as a responsible citizen to save water. Only about one third of respondents (34.3%) believed if they saved more water their lawn or garden would die.

Energy

Saving energy at home did not seem to be an inconvenience for most respondents (80.9%). Nearly all respondents (98%) agreed that it was everyone's responsibility to save energy at home.

Waterways

Overall, respondents agreed that it was everyone's responsibility to try to keep our drains and waterways clean.

Table 5: Summary of responses for questions relating to conservation beliefs.

Statement	1 Strongly agree (%)	2 Agree (%)	3 Neither (%)	4 Disagree (%)	5 Strongly disagree (%)	Mean
Water						
If I save much more water my lawn or garden will die	1.0	33.3	12.1	50.5	3.0	3.21
The amount of money I would save on my water bill by conserving water is important to me	14.1	57.6	5.1	23.2	-	2.37
If I save water now it will mean that there is less chance of future water restrictions	18.2	53.5	5.1	21.2	2.0	2.35
I feel it's my duty as a responsible citizen to save as much water as possible	26.3	70.7	2.0	1.0	-	1.78
Energy						
Saving energy at home will be highly inconvenient	-	14.1	5.1	75.8	5.1	3.72
The money I could save through conserving electricity is not worth the effort	-	21.2	6.1	62.6	10.1	3.62
If I save energy at home there will be less chance of power cuts	15.2	59.6	9.1	12.1	4.0	2.30
It's everyone's responsibility to save energy at home	18.2	79.8	1.0	1.0	-	1.85
Waterways						
Anything my household can do will not make much difference to the stormwater problem	1.0	28.3	7.1	60.6	3.0	3.36
Everyone should be prepared to pay a bit more for drainage and waterways management	9.1	54.5	7.1	27.3	2.0	2.59
Compared to other things stormwater is not a major pollutant of our waterways	-	3.0	2.0	77.8	17.2	3.43
It is everyone's responsibility to try to keep our drains and waterways clean	29.3	70.7	-	-	-	1.71

3.2.4 Conservation attitudes

The majority of respondents displayed strong conservation attitudes for saving water and energy and keeping pollution out of drains and waterways (see Table 6).

Table 6: Summary of responses for questions relating to conservation attitudes.

Statement	1 Strongly agree (%)	2 Agree (%)	3 Neither (%)	4 Disagree (%)	5 Strongly disagree (%)	Mean
Water						
My attitudes towards personally saving water in my household is highly favourable	15.2	79.8	2.0	3.0	-	1.93
My attitude towards personally saving water is extremely negative	-	3.0	2.0	77.8	17.2	4.09
Energy						
My attitude towards personally saving electricity in my home is highly favourable	14.1	75.8	4.0	6.1	-	2.02
Waterways						
My attitude towards personally helping to keep pollution out of our drains and waterways is extremely negative	1.0	6.1	2.0	74.7	16.2	3.99

3.2.5 Emotions

The majority of respondents associated strong positive emotions with doing the right things to save water and looking after our waterways (Table 7).

Table 7: Summary of responses for questions relating to emotions.

Statement	1 Strongly agree (%)	2 Agree (%)	3 Neither (%)	4 Disagree (%)	5 Strongly disagree (%)	Mean
Water						
I save water because it feels right	10.1	70.7	1.0	18.2	-	2.27
It's good to see more people saving water	30.3	64.6	3.0	2.0	-	1.77
Waterways						
I look after our waterways because it feels right	13.1	74.7	4.0	8.1	-	2.07
It's good to see people active in protecting our rivers and streams	39.4	58.6	1.0	1.0	-	1.64

3.2.6 Subjective norms

Respondents generally thought there were some expectations from their friends to save water as well as to protect waterways. Respondents could *neither agree nor disagree* when it came to judging expectations of people in their neighbourhood. A summary of results for subjective norms is provided in Table 8.

Table 8: Summary of responses for questions relating to subjective norms.

Statement	1 Strongly agree (%)	2 Agree (%)	3 Neither (%)	4 Disagree (%)	5 Strongly disagree (%)	Mean
Water						
Most of the people in my neighbourhood think I should save water	2.0	39.4	22.2	31.3	5.1	2.98
Most of my friends think I should save water	3.0	62.6	16.2	17.2	1.0	2.51
Energy						
Most of the people in my neighbourhood think I should save electricity	2.0	39.4	36.4	20.2	2.0	2.81
Waterways						
Most of the people in my neighbourhood think I should protect our waterways	5.1	46.5	35.4	10.1	3.0	2.60
Most of my friends would want me to protect our waterways	9.1	76.8	9.1	5.1	-	2.10

3.2.7 Reported Behaviour

The items in this section were chosen as far as possible from previous studies of water and energy use. The items were selected across a range of frequencies. That is the items varied from many people saying they performed the actions to very few people reporting they performed the actions. As in the international literature the assumption was made that the less frequently a behaviour was performed the harder it was to do. Fortunately we could test this assumption directly for waterways management. Nancarrow et al measured both reported behaviour in this arena and respondents' perceptions of how hard the action was to perform and the assumption was strongly confirmed for the first time (Nancarrow et al, 1995).

The results for these questions are summarised in Table 9.

Water

The majority of respondents (>80%) indicated that they usually swept rather than hosed concrete or paved areas and that they always fixed dripping taps and hoses. Nearly two thirds (62.7%) indicated that they had reduced the area of lawn and other plants to save water. Just over half of the respondents (51.5%) indicated that they frequently hand watered their lawn.

Energy

The majority of respondents (>80%) reported either turning off lights when they left the room, or closing the blinds or curtains on hot or cold days. Just over half the respondents (52.6%) said they always turned electrical appliances off at the wall.

Waterways

Most respondents (70.7%) reported picking up litter regularly from the gutter outside their home. Just under two thirds (63.6%) frequently swept leaves and dirt from the gutter outside their homes. Marginally over half of the respondents (55.5%) had diverted runoff from their roof onto the garden.

Table 9: Summary of responses for questions relating to reported behaviour.

Statement	1 Strongly agree (%)	2 Agree (%)	3 Neither (%)	4 Disagree (%)	5 Strongly disagree (%)	Mean
Water						
I often hand water the lawn	11.1	40.4	8.1	30.3	10.1	2.88
I have reduced my area of lawn and other plants to save water	7.1	55.6	6.1	29.3	2.0	2.64
I usually sweep rather than hose concrete or paved areas	24.2	65.7	3.0	5.1	2.0	1.95
I always fix dripping taps and hoses	18.2	77.8	1.0	3.0	-	1.89
Energy						
I always turn my electrical appliances off at the wall	5.1	47.5	7.1	37.4	3.0	2.86
I always put on more clothing rather than turn up the heating	13.1	62.6	9.1	15.2	-	2.26
I always turn off the lights when I leave the room	8.1	73.7	3.0	15.2	-	2.25
I always close the blinds or curtain on a hot or cold day	23.2	63.6	1.0	11.1	1.0	2.03
Waterways						
I divert runoff from our roof onto the garden	4.0	51.5	4.0	37.4	3.0	2.84
I often sweep leaves and dirt from the gutter outside my home	4.0	59.6	3.0	27.3	6.1	2.72
I regularly pick up litter from the gutter outside my home	7.1	63.6	7.1	15.2	7.1	2.52

Distribution of reported behaviour variable

Responses to the 11 items in Table 9 were summed for each respondent to create a distribution of activities they reported doing to save water and electricity as well as to protect the waterways. A summary of the reported behaviour score is shown in Table 10.

Table 10: Summary of aggregated reported behaviour scores.

Description	
Minimum score	18 (11)
Maximum score	46 (55)
Mean score	26.83

Note: The number in brackets is the minimum or maximum possible score

Figure 2 shows the distribution of reported behaviour scores. Higher scores indicate a lower amount of activities were performed by the respondents to save water and electricity and to protect the waterways. Respondents generally reported that they had performed some activities to save water and electricity and to protect the waterways. One fifth of respondents reported carrying out all the activities listed in the study.

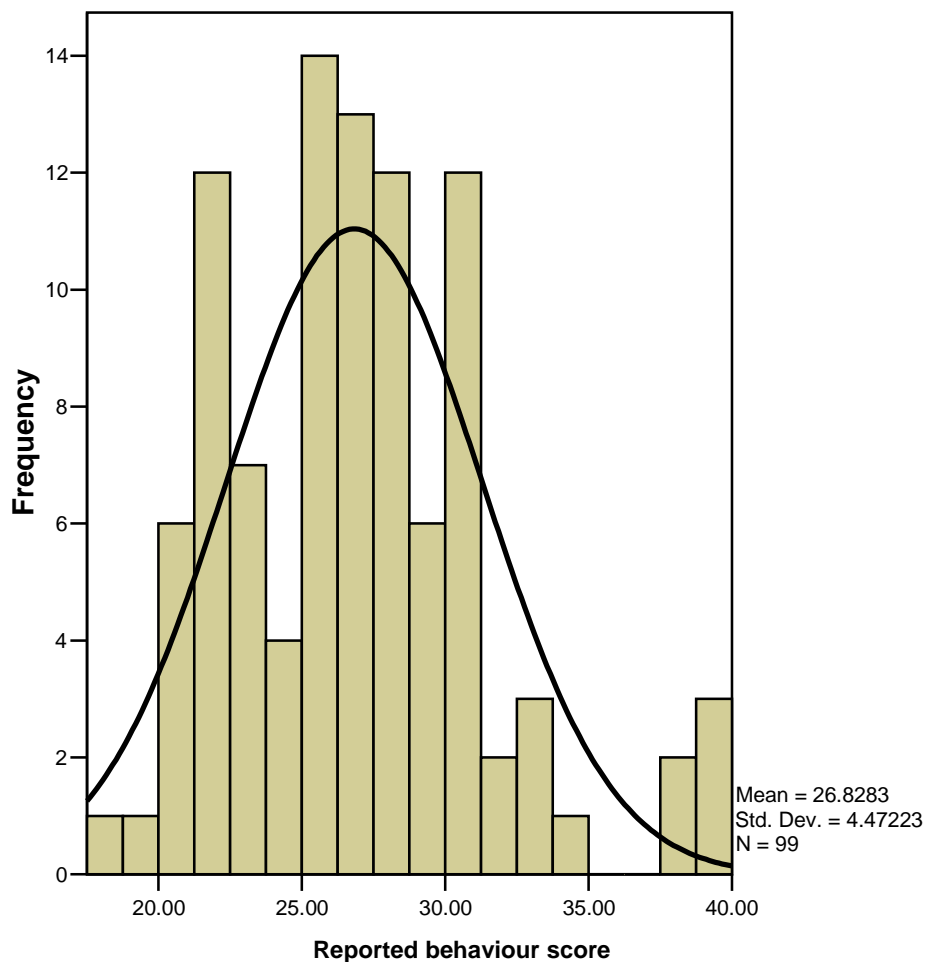


Figure 2: Distribution of reported behaviour scores.

3.2.8 General reported behaviour

The majority of respondents (89.9%) in the survey were not an active member of a conservation group. However, most reported environmentally benign behaviours with more than 80% indicating having used less chemicals and fertiliser on their land ‘this’ year and 89% stating they would do whatever they could to make sure they did not

increase air pollution (Table 11). Only about one fifth of respondents (22.2%) reported using their car more this year than last year.

Table 11: Summary of responses for questions relating to general reported behaviour.

Statement	1 Strongly agree (%)	2 Agree (%)	3 Neither (%)	4 Disagree (%)	5 Strongly disagree (%)	Mean
I am an active member of a conservation group	-	9.1	1.0	76.8	13.1	3.94
I have used my car more this year than last year	2.0	20.2	14.1	53.5	10.1	3.49
I have visited a heritage building last year	2.0	52.5	3.0	33.3	9.1	2.95
I have visited a national park in the last year	8.1	66.7	-	19.2	6.1	2.48
I have donated money or time to groups trying to retain our variety of native animals and plants	8.1	63.6	4.0	21.2	3.0	2.47
I have used less chemicals and fertiliser on my land this year	15.2	67.7	6.1	9.1	2.0	2.15
I do whatever I can to make sure I don't increase air pollution	12.1	75.8	6.1	6.1	-	2.06

Distribution of general reported behaviour

Responses to the 7 items in Table 11 were summed to derive a general reported behaviour score. A summary of the score is shown in Table 12.

Table 12: Summary of aggregated general reported behaviour scores.

Description	
Minimum score	14 (7)
Maximum score	31 (35)
Mean score	19.56

Note: The number in brackets is the minimum or maximum possible score

Figure 3 shows the distribution of general reported behaviour scores. Again respondents generally reported undertaking some of the activities listed in Table 11. Very few respondents reported having either performed all the activities or none of them.

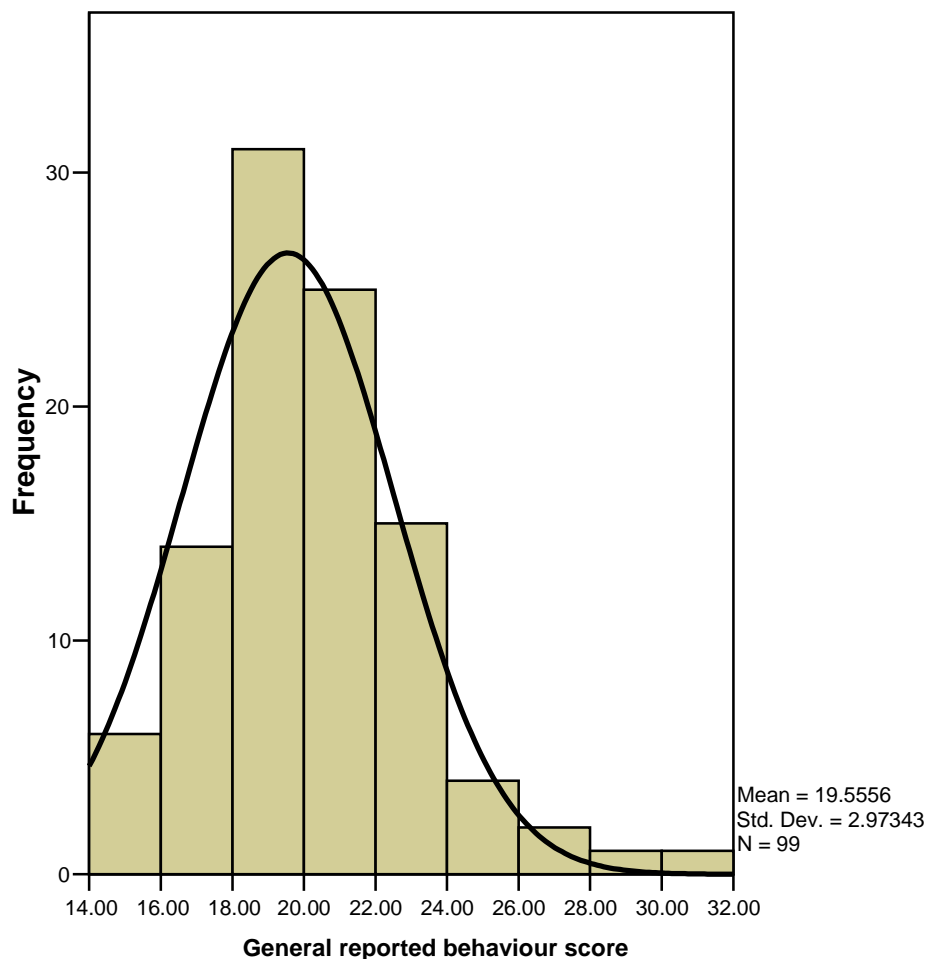


Figure 3: Distribution of general reported behaviour scores.

The reliability of the scale totalling all reported environmental behaviours was examined using the Quest program (Adams and Khoo, 1996) which examines the reliability of both individual items and people. Most items seemed to be acceptable and, because they reflect the range of issues of relevance to State of the Environment Reporting have been largely retained.

The total scale had an item response person separation reliability of 0.57 (the proportion of the observed estimate variance that is considered true). While this reliability is considered adequate for now, administration of the revised questionnaire to a larger sample and subsequent analysis can refine the scale and it can possibly improve.

3.2.9 Social desirability

The responses to the social desirability scales are shown in Table 13. It can be seen that despite the extremity of the statements there was a tendency for some of these to be agreed with. The issue of conservation may therefore be one in which there is considerable public sympathy for and it may be no surprise that the responses to the values and attitude scales are quite skewed. While skewed responses such as this are undesirable if one is seeking to differentiate between groups the effectiveness of using “believable’ but more extreme statements to improve the normality of the distribution and thus site discrimination is doubtful.

Table 13: Summary of responses for questions relating to social desirability.

Statement	1 Strongly agree (%)	2 Agree (%)	3 Neither (%)	4 Disagree (%)	5 Strongly disagree (%)	Mean
I have never wasted a drop of water	3.0	9.1	8.1	70.7	9.1	3.74
Saving energy in the home is one of the most important concerns in my life	5.1	50.5	12.1	30.3	2.0	2.74
I would always “do without” than do something that degrades the environment	8.1	62.6	15.2	14.1	-	2.35

In addition to the scaled responses respondents were invited to make any comments they liked about the questionnaire itself and the topic of the environment. A summary of these responses is shown in Appendix 4.

3.2.10 Actual Behaviour

Data was obtained from the relevant utility providers on average household water and electricity consumption in each of the “icon” locations. This information can be used with the mean responses to the questionnaires provided by each sample and attitude and reported behaviour figures correlated with actual consumption.

Average electricity consumption per household in Hamersley for the financial year ending 2004 was 5,883 kilowatt hours (kWh) and in Merredin was 5,524 kWh for the same period. This is based on data for average consumption by postcode in WA.

The average per capita water use in the metropolitan region was 112 kilolitres (kL) per person for the financial year ending 2004 and in the Agricultural district (including Merredin) was 159 kL per person for the same period. Data on per capita water use is available in a more disaggregated format for some parts of WA.

3.3 The relationship between variables

The simple correlations between each of the key variables are shown in Table 14.

Table 14: Pearson Correlations between attitudinal and reported behaviour variables for both locations.

	1	2	3	4	5	6	7	8	9
1	x	0.10	-0.07	-0.12	0.04	-0.27	0.11	0.15	0.16
2	0.49**	x	0.57**	0.31*	0.24	-0.07	0.53**	0.31*	-0.05
3	0.32*	0.68**	x	0.47**	0.17	-0.07	0.51**	0.35*	0.06
4	0.51**	0.56**	0.50**	x	-0.08	0.31*	0.24	0.09	0.00
5	0.04	0.32*	0.29*	0.32*	x	0.46**	-0.15	0.19	0.14
6	0.22	0.24	0.33*	0.13	0.25	x	-0.21	0.07	0.08
7	0.22	0.36*	0.44**	0.37**	0.25	0.02	x	0.16	0.02
8	0.32*	0.21	0.21	0.24	-0.01	0.09	0.33*	x	0.12
9	0.27	0.44**	0.47**	0.41**	0.30*	0.44**	0.25	0.04	x

Note: Hamersley (N=49), Merredin (N=50), * p<0.05 , **p<0.01

Key: 1=Overarching Values
 2=Environmental Values
 3=Conservation Beliefs
 4=Conservation Attitudes
 5=Reported modelled behaviours
 6=General reported behaviours
 7=Emotion
 8=Subjective Norm
 9=Social Desirability

It may be noted that the correlations between the social desirability scale and the other variables seems to have a different pattern between Merredin and Hamersley. While none of them are statistically significant for Merredin, five of the nine are statistically significant for the Hamersley sample. This suggests that adjustments for social desirability when comparing icon communities are desirable when comparisons are made. It is interesting to note that social desirability appears to have potentially different roles for these two communities.

To establish whether social desirability was important in interpreting the differences between the communities, two types of comparisons were made between the two locations. Firstly, a multivariate analysis of variance was conducted without factoring out any social desirability effect. Secondly, the same analysis was repeated, only this time using scores on the social desirability scale as a covariate for each of the scores. The estimated marginal means for each analysis and the significance of the difference between the two sites are shown in Table 15.

Table 15: Comparison between means for (A) multivariate analyses of variance and (B) multivariate analysis of variance using social desirability as a covariate.

	Multivariate analyses of variance		Multivariate analysis of variance using social desirability as a covariate	
	Hamersley	Merredin	Hamersley	Merredin
Overarching ethics	15.4	14.4*	15.2	14.6
Environmental values	5.8	5.3	5.7	5.5
Conservation beliefs	30.6	28.4*	30.1	29.0
Conservation attitudes	7.9	7.9	7.3	7.6
Modelled reported behaviours	29.5	29.9	27.7	30.2
General reported behaviours	16.9	16.7	16.6	17.0
Subjective norm	12.9	13.1	11.9	12.3
Emotion	7.7	7.8	7.1	7.3

Note: * $p < 0.01$

It can be seen that there are slight changes in estimated means between the analyses when social desirability is controlled for. It can also be seen that in taking account of the social desirability measure, differing conclusions can be drawn. The apparent differences in means between Hamersley and Merredin for overarching ethics and conservation beliefs disappeared when social desirability is taken into account. For this reason the social desirability scale was retained in the final instrument.

3.3.1 Scale reliability

Each of the scales was tested for reliability after a factor analysis had been undertaken which generally supported the structure.

In considering the reliability of the various items comprising the questionnaire, Cronbach's Alpha was determined for those that were expected to form a scale (see Table 16). This was not necessarily the case for the overarching ethics questions that were deliberately composed to cover a variety of topics. These items as shown above formed consistent patterns among groups of individuals. The reported behaviour scales were subjected to Rasch analyses.

The attitudinal reliability results are summarised in Table 16 for each of the specified subscales both with and without low correlation items. It is noticeable that the reliability of the attitudinal responses is not high nor is that of the social desirability questions. There has been some questioning as to whether the social desirability items are in fact good

measures of social desirability. Even though they seem extreme in their formulation it appears that many respondents do in fact have very strong positive attitudes towards conservation. The hypothesised model indicated that there may be covariance between the social desirability, conservation beliefs and subjective norms variables. A simple regression predicting social desirability using conservation beliefs and subjective norms (over all three conservation behaviours) showed that conservation beliefs did predict social desirability scores significantly ($R^2=14\%$) but subjective norms did not. Partial correlations between behavioural beliefs and reported behaviour for the three modelled variables did not reveal a significant correlation with reported behaviours and, as stated below, did not significantly affect the simple regression results reported. These relationships do however need further investigation with a larger sample.

Table 16. Summary of attitudinal reliability analysis using Cronbach's Alpha.

Subscale	Cronbach's Alpha (r)	Items Removed	New Cronbach's Alpha
Environmental Values	0.611		
Conservation Beliefs	0.577	Item 7	0.651
Conservation Attitudes	0.441	Item 3	0.472
Emotions	0.651		
Subjective Norms	0.738		
Social Desirability	0.426		

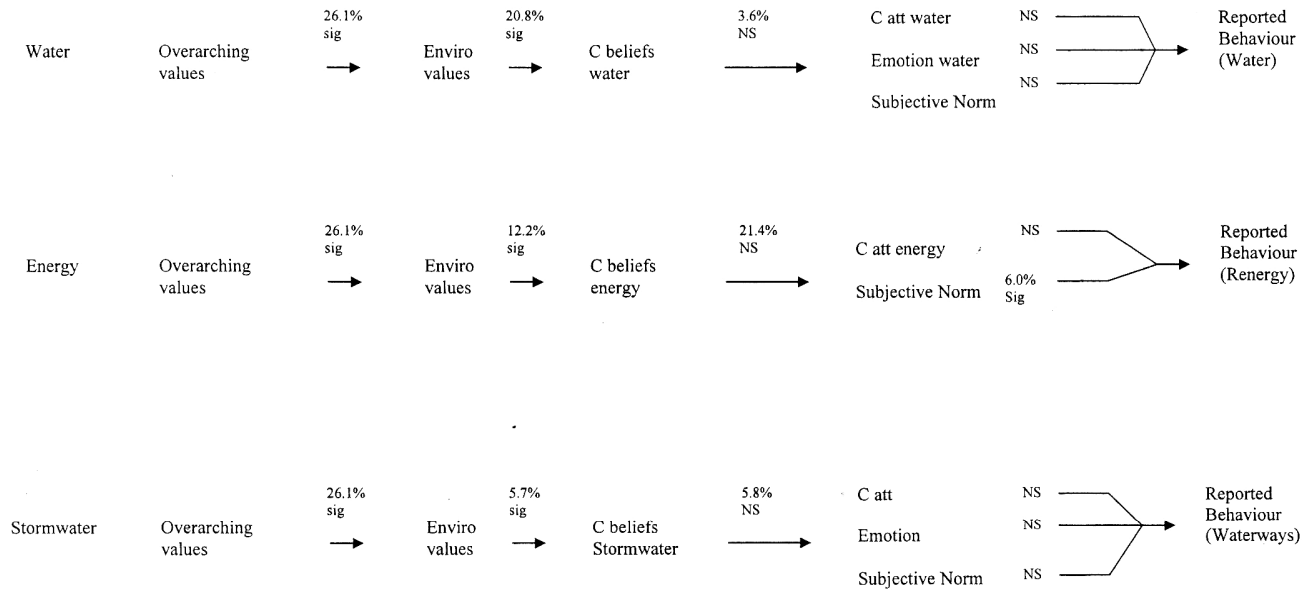
3.4 Simple Regression Analysis Relating to the Hypothesised Model

For the purposes of a test analysis it was concluded that the scales were reliable enough to include in a simple regression based path analysis of the main relationships between the variables. Ideally a structural equation approach may have been preferable but the sample size was not sufficient to allow such an approach. Although the responses to the emotion questions tended to correlate with the subjective norm responses statistically, it was felt that they represented different motivations and were therefore analysed separately in the regressions.

A summary of these analyses is shown in Figure 4. Analyses are presented separately for household water, household energy and waterways. It can be seen that only reported energy behaviour was significantly accounted for by the simple model. When social desirability was controlled, there was very little difference in the equation.

Given the simple nature of the analysis there were very encouraging signs that the model and approach were tenable. For all three topics scores on the overarching values (the responses to these were added for this analysis) significantly predicted environmental values and these values on all three occasions predicted conservation beliefs. As shown in the first correlation table the values scores also correlated significantly with the attitudinal scores

SIMPLE REGRESSION TESTS OF MAIN HYPOTHESIS FROM ATTITUDE – BEHAVIOUR MODEL



The percentage number indicates the amount of variation explained by each path.

Figure 4: Regression-based path analysis of the main relationships between variables.

The model shown in Figure 1 suggests that beliefs should predict attitudes. Attitudes, subjective norms and emotions should predict reported behaviours. The figures show that total beliefs did not predict attitudes and attitudes did not predict behaviour. On one occasion the score on the subjective norm did significantly predict behaviour. Further, for waterways the total beliefs scores significantly predicted behaviour. It must be remembered however that it may not be appropriate to use the combined beliefs scores as a predictor of behaviour as it has limited reliability. Nevertheless, it may be noted that none of the single belief items from all three areas were predictive of reported behaviour.

From the analysis of household energy however, there was some predictive ability for reported behaviour from the social norm variable. Unfortunately there were no satisfactory “emotion” items for energy in this version of the questionnaire that enabled this variable to be tested. This has been rectified in the final version.

Similar analyses were undertaken with all three resources combined. Comparable findings resulted. Expected relationships occurred from overarching values through to beliefs and then attitudes. Reported behaviour was not, however, predicted.

The failure to predict reported behaviour is not too surprising in that attitudinal theory strongly suggests that behaviour is preceded by behavioural intention and this may mediate the explanatory effects of attitudes, subjective norms and emotions. In the context of State of Environment reporting, it was considered that the collection of behavioural intention data was unwise and probably uninterpretable. A comparison of what people will intend to do in the future over a period of time would seem difficult to interpret.

In summary, given that the analysis here is somewhat truncated because of sample size, the primary hypotheses have encouraging support, with the exception of the prediction of reported behaviour. It is apparent that, with some revision, the instrument is feasible to run using the telephone and is capable of collecting adequate data for observing “progress” and change in the population. It has also been demonstrated that the survey

can be successfully carried out in both urban and rural locations, as the sample from Merredin included both town and country dwellers.

4.0 General and Specific Comments on the Questions

In addition to examining the overall integrity of the data and the model upon which the questionnaire was derived, respondents were asked to provide comments on the questionnaire wording and structure. While all these comments are not recorded two general comments were made that are worthy of note.

4.1 Friends or neighbours?

The interviewers noted that there seems to be shifts in people's conceptions of a sense of community. Within the samples, it appears that conventions of sense of community tend not to be defined within the neighbourhood. Many participants commented that environmental issues are not something that would be discussed between neighbours, nor do they know or have the right to assume what their neighbours would think of them. There appeared to be minimal interaction between neighbours. Adding to this, is the observed difference between making assumptions regarding what neighbours think and what friends think. While there was some hesitation regarding commenting on friends' perceptions (due mainly to a lack of environmental discourse between parties) participants tended to be more willing to comment and make assumptions. A strategy to overcome this when considering subjective norms will be to replace the term "neighbours" with "local community".

4.2 Improvement of Questionnaire Structure

Although it may be a function of limited practice, participants appear to convey some confusion in the early part of the questionnaire. This difficulty appears to be related to statements being too specific (e.g. *if I save too much more water my garden may die*), too ambiguous (e.g. *I would always "do without" rather than do something that degrades the environment*), neighbours perceptions (e.g. *most of the people in my neighbourhood think I should save water*) or having convoluted wording (e.g. *my attitude towards personally helping to keep pollution out of our drains and waterways is extremely negative*).

Additionally, these statements may be perceived as complex or potentially confronting as they ask participants to reflect on conservation beliefs, social desirability, conservation attitudes, emotions and subjective norms, all of which are fairly abstract to the general public. For this reason the revised questionnaire could open the survey with statements that consider, general behaviours (Part 6) or general reported behaviours (Part 7), as these statements were generally better received and were less confronting to participants.

The disadvantages of this approach are that an acquiescent response "set" could appear. For this reason it was decided to continue with the current random format backed up by a stronger instructional set reinforcing the value of State of the Environment reporting.

4.3 Overcoming Perceptions of Length

Despite the questionnaire being limited to about fifteen minutes it was perceived to be too long by some respondents. Contributing to this may be the perception that statements are repetitive. The need for all questions should be emphasised in future administrations.

4.4 Specific Comments and Changes Made

The specific comments received are shown in Appendix 4. Twenty-six changes were made as a consequence of the comments, although on some occasions the changes were different from those suggested. Twelve new questions were added and item changes were made to ensure balance among question categories. Changes were also made to the wording of some questions to improve their clarity.

It was recognised that two of the survey questions may not be applicable to all rural town or city dwellers in WA. However, these were retained and have been allowed for by including a 'not applicable' response in the scale. This is not anticipated to affect the analysis to any noticeable extent.

5.0 The recommended WA Community State of Environment Inventory (WACEI)

5.1 Procedural Details

The revised inventory is presented in Section 5.3. The instructions for the administration of the questionnaire will need to include background information on State of the Environment reporting, the Agency sponsoring the questionnaire and the purposes for which the data will be used. It would be desirable to offer the respondent a one page summary of the results after completion of the analysis. The questionnaire can be administered by telephone.

It would be desirable for 80 to 100 people to be randomly sampled from at least 15 icon communities. It must also be noted that the telephone numbers are best selected from town dwellers, given the nature of the questionnaire. A rural landholder questionnaire can be developed in the future using insights from the current survey.

It must be emphasised that this is the first version of the Inventory and that further analyses with greater sample size may lead to further modification of the inventory. The pre-test does however demonstrate that the approach is a promising one which can be confidently applied now.

5.2 Inventory Content

The WACEI contains the following items

- Overarching Environmental Ethics (6 items)
- Environmental Values (3 items)
- Conservation Beliefs
 - Water (3 items)
 - Energy (3 items)
 - Waterways (3 items)
- Attitudes
 - Water (1 item)
 - Energy (1 item)
 - Waterways (1 item)
- Subjective Norm
 - Water (2 items)
 - Energy (2 items)
 - Waterways (2 items)
- Emotions
 - Water (2 items)
 - Energy (2 items)
 - Waterways (2 items)
- Reported Behaviour
 - Water (3 items)
 - Energy (3 items)
 - Waterways (3 items)
 - General behaviours (7 items)
- Social Desirability (3 items)

The open ended item asking about environmental concerns was retained so that a record can be kept of changing topical issues.

The scale to which each statement is associated is marked on the inventory. The agree/disagree items are placed in random order and perhaps two or three orders can be randomly chosen to create differing forms to guard against order effect.

5.3 WA Community State of Environment Inventory

Write the number from the scale next to each statement

Scale:

1	2	3	4	5	6
Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree	NA

Using the Scale above please tell me how much you agree or disagree with these statements

- The money I could save through conserving electricity is not worth the effort
CB Energy
- I would never do anything that degrades the environment
Social Desirability
- Most of the people in my local community think we should all save water
Subjective Norm-Water
- I have a negative attitude towards personally helping to keep pollution out of WA drains and waterways
Attitude Waterways
- I always ensure that there are no oil leaks from my car
Reported Behaviour-Waterways
- I get a great feeling of fulfilment when I save electricity
Emotion Energy
- Saving our environment for the future is more important than profiting now
Overarching Ethics
- I feel it's my duty as a responsible citizen to save as much water as possible
CB Water
- I do whatever I can to make sure I don't increase air pollution
General Reported Behaviour
- I have a highly favourable attitude towards personally saving water in my household
Attitude Water
- Most of the people in my local community think we should all protect our waterways
Subjective Norm Waterways
- I would get a feeling of great fulfilment in helping protect WA rivers and streams
Emotion Waterways
- Protecting the environment and preserving nature is an important guiding principle for me
Environmental Values

Write the number from the scale next to each statement

Scale:

1	2	3	4	5	6
Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree	NA

Saving energy in the home is one of the most important concerns in my life Social Desirability

I always turn my electrical appliances off at the wall rather than leave them on standby (e.g. televisions, computers) Reported Behaviour Energy

I often hand water my lawn and plants Reported Behaviour Water

I have used my car more this year than last year Reported Behaviour General

I always fix dripping taps and hoses Reported Behaviour Water

It's everyone's responsibility to try to keep our drains and waterways clean. CB Waterways

I have a highly favourable attitude towards personally saving electricity in my home Attitudes - Energy

The natural environment has the same right to consideration that people have Overarching Ethics

I usually put on more clothing rather than turn up the heating Reported Behaviour Energy

If I save water now it will mean that there is less chance of future water restrictions CB Water

Everyone should be prepared to pay a bit more money for waterways management CB Waterways

I feel most of my friends would want me to help avoid pollution in our waterways Subjective Norm Waterways

There are no general rules for environmental management it depends on the situation Overarching Ethics

The amount of money I would save on my water bill by conserving water is important to me. CB Water

Write the number from the scale next to each statement

Scale:

1	2	3	4	5	6
Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree	NA

- I have never wasted a drop of water. Social Desirability
- It's important for me to feel I am fitting in with nature Environmental Values
- I have donated money or time to groups trying to retain our variety of native animals and plants Reported Behaviour General
- I get a great sense of fulfilment when I do something that saves water Emotions Water
- I save water because it feels right Emotions Water
- I often sweep any leaves and dirt from the gutter outside my home Reported Behaviour Waterways
- Australia needs to make as much money out of our land and water resources as we can Overarching Ethics
- I divert runoff from our roof for use around the home Reported Behaviours Waterways
- I am an active member of a conservation group Reported Behaviour General
- It's everyone's responsibility to save energy at home CB Energy
- Most of the people in my local community think we should all save electricity Subjective Norm Energy
- I have visited a national park in the last year Reported Behaviour General
- My household cannot make much difference to waterways pollution problems CB Waterways
- I feel most of my friends think I should save water Subjective Norm Water
- I have visited a heritage building in the last year Reported Behaviour General

Write the number from the scale next to each statement

Scale:

1	2	3	4	5	6
Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree	NA

- I have used less chemicals and fertiliser on my land this year Reported Behaviour General
- Making sacrifices for the environment is important for our long term survival Overarching Ethics
- I look after our waterways because it feels right Emotion Waterways
- For me it's a matter of principle that we should try to live in harmony with other species Environmental Values
- I always close the blinds or curtains on a hot day Reported Behaviour Energy
- If I save energy at home there will be less chance of power cuts CB Energy
- There is no relationship between the economy and the natural environment Overarching Ethics
- I have reduced my area of lawn and other plants to save water Reported Behaviour Water
- I feel most of my friends think I should try to save electricity in my home Subjective Norm Energy
- I feel good if I do something to cut down on electricity use Emotion Energy
- Are there any particular environmental issues that concern you? Yes 1 No 2
- If Yes which is the most important one?

Demographics

How long have you lived at this address?

- Less than 1 year 1
- Between 1 and 5 years 2
- Between 6 and 10 years 3
- Between 10 and 15 years 4
- Between 15 and 25 years 5
- Over 25 years 6

Do you own or rent this property?

- Own 1 Rent 2 Other 3

How many people currently live in your household? _____

Would you please tell me which of the following categories best describes your age.

- Less than 24 years 1
- 24 to 39 years 2
- 40 to 55 years 3

- 56 to 65 years 4
- 66 to 75 years 5
- More than 75 years 6

Would you please tell me which category best describes your **highest level** of education.

- All or some of primary school 1
- All or some of secondary school 2
- Partial trade or technical qualification..... 3
- Trade or technical qualification 4
- Partial university qualification 5
- University qualification 6

Would you please tell me which category best describes your household **gross annual** income.

- Less than \$22,000 1
- \$22,001 to \$42,000 2
- \$42,001 to \$62,000 3
- \$62,001 to \$82,001 4
- \$82,001 to \$100,000 5
- More than \$100,000 6
- Don't Know 7
- Refuse 8

Membership of conservation or heritage group

- Yes 1
- No 2

Please note the respondent's gender

- Female 1
- Male 2

6.0 References

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7.0 Appendices

- Appendix 1 Reference List for Motivators for Attitude Behaviour Studies
- Appendix 2 Pre-Tested Questionnaire: State of the Environment Reporting Community Questionnaire
- Appendix 3 Interview Script
- Appendix 4 Specific suggestions for change from the Pre-test
- Appendix 5 Qualitative Analysis of Respondent Comments

Reference List for Motivators for Attitude Behaviour Studies

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**Pre-Tested Questionnaire:
State of the Environment Reporting Community Questionnaire**

Write the number from the scale next to each statement

Scale:

1	2	3	4	5	6
Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree	NA

Using the Scale above please tell me how much you agree or disagree with these statements

- If I save much more water my lawn or garden will die _____
- I would always “do without” than do something that degrades the environment _____
- Most of the people in my neighbourhood think I should save water _____
- My attitude towards personally helping to keep pollution out of our drains and waterways is extremely negative _____
- I always turn off the lights when I leave the room _____
- It’s good to see more people saving water _____
- Saving our environment for the future is more important than profiting now _____
- I feel it’s my duty as a responsible citizen to save as much water as possible _____
- I regularly pick up litter from the gutter outside my home _____
- I do whatever I can to make sure I don’t increase air pollution _____
- My attitude towards personally saving water in my household is highly favourable _____
- Most of the people in my neighbourhood think I should protect our waterways _____
- It’s good to see people active in protecting our rivers and streams _____
- Protecting the environment and preserving nature is an important guiding principle for me _____

Write the number from the scale next to each statement

Scale:

1	2	3	4	5	6
Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree	NA

Saving energy in the home is one of the most important concerns in my life _____

I always turn my electrical appliances off at the wall _____

I often hand water the lawn _____

I have used my car more this year than last year _____

I always fix dripping taps and hoses _____

It's everyone's responsibility to try to keep our drains and waterways clean. _____

My attitude towards personally saving electricity in my home is highly favourable _____

The natural environment has the same right to consideration as people have _____

I usually put on more clothing rather than turn up the heating _____

If I save water now it will mean that there is less chance of future water restrictions _____

Everyone should be prepared to pay a bit more for drainage and waterways management _____

Most of my friends would want me to protect our waterways _____

There are no general rules for environmental management it depends on the situation _____

The amount of money I would save on my water bill by conserving water is important to me. _____

Write the number from the scale next to each statement

Scale:

1	2	3	4	5	6
Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree	NA
I have used less chemicals and fertiliser on my land this year					_____
Looking after the environment is important for our long term survival					_____
I look after our waterways because it feels right					_____
For me it's a matter of principle that we should try to live in harmony with other species					_____
I always close the blinds or curtains on a hot or cold day					_____
If I save energy at home there will be less chance of power cuts					_____
There is no relationship between the economy and the natural environment					_____
I have reduced my area of lawn and other plants to save water					_____
The money I could save through conserving electricity is not worth the effort					_____
Compared with other things stormwater is not a major pollutant of our waterways					_____

Are there any particular environmental issues that concern you? Yes 1 No 2

If Yes which is the most important one?

Demographics

How long have you lived at this address?

- Less than 1 year 1
- Between 1 and 5 years 2
- Between 6 and 10 years 3
- Between 10 and 15 years 4
- more than 15 years 5

Do you own or rent this property?

- Own 1 rent 2

How many people live in your household? _____

Would you please tell me which of the following categories best describes your age.

- Less than 24 years 1
- 24 to 39 years 2
- 40 to 55 years 3
- 56 to 65 years 4
- 66 to 75 years 5
- More than 75 years 6

Would you please tell me which category best describes your **highest level** of education.

- All or some of primary school 1
- All or some of secondary school 2
- Partial trade or technical qualification 3
- Trade or technical qualification 4
- Partial university qualification 5
- University qualification 6

Would you please tell me which category best describes your **gross annual** income.

- Less than \$22,000 1
- \$22,001 to \$42,000 2
- \$42,001 to \$62,000 3
- \$62,001 to \$82,001 4
- \$82,001 to \$100,000 5
- More than \$100,000 6
- Don't Know 7
- Refuse 8

Membership of conservation or heritage group

- Yes 1
- No 2

Please note the respondent's gender

- Female 1
- Male 2

Interview Script

Introduction

Hello my name is I am calling to see if you could help CSIRO with some research about people and the environment. Would you mind answering a few questions?

Wait for response

I would like you to answer a questionnaire that will take about 10 to 15 minutes. This is a trial and we would like any comments that you have at the end of it. There are no right or wrong answers. Just answer each question with the first opinion that occurs to you.

If this is still suitable

I will read you a series of statements, and if you could please let me know if you strongly agree, agree, neither agree nor disagree, disagree and strongly disagree.

Here is the first statement.

Conduct survey

Have you any feedback regarding the contents or nature of the survey.

If probing necessary

Perhaps anything you like, dislike or perhaps think we should change.

Receive feedback

Thank you so much for your time and contribution.

End survey

Specific suggestions for change from the Pre-test

The following table summarises participant feedback obtained during the survey process. Some suggestions have been given regarding potential amendment of particular attitude statements.

Feedback Table

Subscale	Item	Participant Feedback	Suggested Change
Overarching Values	1.3 There are no general rules for environmental management, it depends on the situation.	Perceived as a “right” or “wrong” question	
	1.6 There is no relationship between the economy and the natural environment.	Perceived as a “right” or “wrong” question.	
	1.4 We need to make as much money out of our land and water resources as we can	Confusion over who “we” represents. E.g. the family, the wider community or the state?	Define what is meant by “we”
Conservation Beliefs	3.1 If I save much more water my lawn or garden will die	The statement assumes that the participants do save water. Additionally, those respondents have a garden. Bore water use was consistently perceived by participants as not necessary of conservation	Rephrase statement to: “If I save water my lawn and garden will die”.
	3.5 Everyone should be prepared to pay a little more for drainage and waterways management	This item could be made into two statements as drainage and waterways were perceived as separate management issues	Create two statements: “Everyone should be prepared to pay a little more for drainage management” and “Everyone should be prepared to pay a little more for waterways management”
	3.9 Anything my household can do will not make a difference to the storm water problem	There was some confusion over the negative wording. This statement was repeated from some participants. Additionally, some participants requested a definition of ‘stormwater’	Rephrase statement to: “My household can not make much difference to the stormwater problem”
	3.12 Compared with other things stormwater is not a major pollutant of our waterways	Some participants requested a definition of ‘stormwater’	
Conservation Attitudes	4.1 My attitude towards personally helping to keep pollution out of our drains and water ways is	There was some confusion over the negative wording. This statement was repeated	Rephrase statement to: “I have an extremely negative attitude

Subscale	Item	Participant Feedback	Suggested Change
	extremely negative	for some participants	towards personally helping to keep pollution out of our drains and water ways”
	4.2 My attitude towards personally saving water in my household is highly negative	There was some confusion over the wording of this statement and was repeated for some participants	Rephrase statement to: “I have a highly favourable attitude towards personally saving water in my household”
		There was some confusion over the wording of this statement, and was repeated for some participants	
	4.4 My attitude towards personally saving water is extremely negative	There was some confusion over the negative wording. This statement was repeated for some participants	Rephrase statement to: “I have an extremely negative attitude towards personally saving water”
Emotions and Subjective norms	5.1 Most of the people in my neighbourhood think I should save water	It seems that adopting the ‘neighbourhood’ as a community in which subjective norms may be developed is outdated. Many participants comment they were uneasy in assuming what their neighbours think about their behaviours. It appears that community is defined by non-geographical factors. Furthermore, many participants did not know their neighbours, or had never discussed such issues with their neighbours. Additionally, some participants perceived the statement as assessing whether their neighbours thought they were wasting water and were offended by this statement.	Remove the term ‘neighbourhood’ from the questionnaire and replace with ‘local community’. Remove the term “I and replace with “we”. Rephrase statement as “Most of the people in my community think we should all save water”. This is necessary as there appears to be some discrepancy regarding current and traditional conceptualisations of ‘community’. Communities appear now to be more relational rather than geographical.
	5.2 It is good to see more people saving water	This statement was criticised for assuming people see others actively saving water	Rephrase to “I would like to see more people saving water”
	5.3 Most of the people in my neighbourhood think I should protect our waterways	See response for item 5.1	“Most of the people in my community think we should all protect our waterways”

Subscale	Item	Participant Feedback	Suggested Change
	5.4 It's good to see more people active in protecting our rivers and streams	This statement was criticised for assuming people see others actively protecting waterways. Additionally, it was perceived as contextually inappropriate for rural communities as they have no naturally occurring water ways to conserve.	
	5.5 Most of my friends would want me to protect our waterways	Several participants stated they were unsure of what their friends expectancies of them were and were thus hesitant to respond to the item	
	5.7 I save water because it feels right	Several participants stated they do not save water because it feels right, rather, that it is something that must be done. This response conveys an interesting dimension to people's perception of water usage. For such participants, it appears that saving water has become necessary to their lifestyle and has become a social norm. The normalising of saving water however is not necessarily depicted as a moral act, nor does it hold an emotional attachment as the statement implies. Rather, it seems that the act of saving water relates to expectancy. This differentiation suggests that measuring emotions and subjective norms assumes contingency between these constructs.	
	5.8 Most of the people in my neighbourhood think I should save electricity	See response to item 5.1 regarding the term 'neighbourhood'	
	5.9 Most of my friends think I should save water	Refer to response to item 5.5	
Reported Behaviours	6.2 I regularly pick up litter from the gutter outside my home	Some participants had difficulty determining if the statement was attempting to gauge their act of picking up	Rephrase statement to: "I pick up litter if it is in my street"

Subscale	Item	Participant Feedback	Suggested Change
		litter or if they had litter outside their home. The term 'gutter' leads to some confusion as whether this means roof guttering or the street verge of most suburban houses. Many urban participants did not have gutters on the street	
	6.3 I often hand water the lawn	This statement was contextually inappropriate for some participants living arrangements e.g. apartments, retirement villages	Replace with an alternative water conservation behaviour
	6.4 I have used my car more this year than last year	On occasion not all participants surveyed had a car	It may be useful to include a statement that refers to participants frequency of public transport use
	6.7 I often sweep leaves and dirt from the gutter outside my home	Refer to response to item 6.3	
	6.8 I divert runoff from our roof onto the garden	On occasion participants comments that they divert their runoff for personal usage e.g the use of rain water tanks	Rephrase statement to: "I divert runoff from our roof for use around the home"
	6.10 I have used less chemicals and fertilisers in my land this year	Some participants did not use chemicals and fertilizers and had no means of comparison	Rephrase statement to: "I use fertilizers and chemicals on my land"
	6.11 I always close the blinds or curtains on a hot or cold day	Some participants commented that they perceived letting warm sunlight into the home during winter as energy conserving behaviour	Rephrase statement to: "I close the blinds on a hot day"
General Reported Behaviours	7.2 I always turn my electrical appliances off at the wall	Some participants were confused by the term "electrical appliances". For instance, are televisions included in this category?	Rephrase statement to include an example of the electrical appliances the statement is referring to.
	7.4 I am an active member of a conservation group		This statement could be removed as it is included in the demographic section of the questionnaire.
	7.6 I have visited a heritage building last year	There needs to be some definition as to what a heritage building is. Also, the intent to visit a heritage building is not conveyed in this statement.	Rephrase statement to: "I have visited a heritage building in the last year"

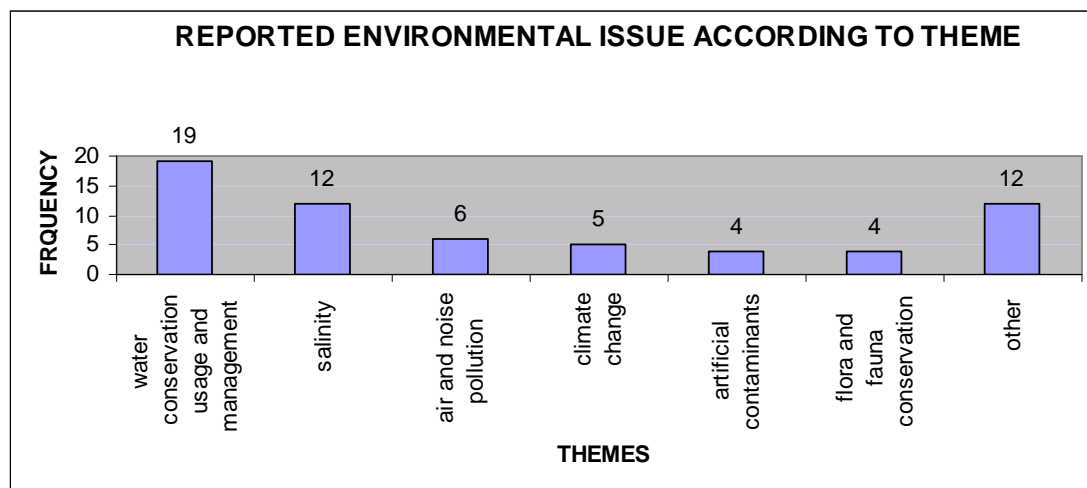
Subscale	Item	Participant Feedback	Suggested Change
Social Desirability	8.1 I would always 'do without' than do something that degrades the environment	The phrase "do without" was perceived as to ambiguous by several participants.	There needs to be further clarity around whether participants make personal sacrifices for environmental conservation.
	8.2 Saving energy at home is one of the most important concerns in my life	There were several comments made by participants that the statement "most important" is too strong.	Rephrase statement to: "Saving energy at home is an important concern in my life"
	I have never wasted a drop of water	There were several comments made by participants that the term "never" is too strong.	Rephrase statement to: 'I try not to waste water"
Demographic Data	How long have you lived at your current address?	The response categories tend to undermine the length of time that some farming families have lived on their land. This is an important demographic as it may depict knowledge and expertise.	Extend the time frames of response categories given
	Do you own or rent this property?	On occasion, participants surveyed were still living with their parents and conveyed that this question did not apply to their current situation.	
	How many people live in your household?	There needs to be some specification of how many people live there <i>currently</i> . Also may not be representative of family rather, representative of working groups also within a farming group.	Rephrase question to: "How many people currently live in your household?"
	Would you please tell me which category best describes your gross annual income.	Assessing people's annual income does not appear to accurately reflect participant's qualifications and skills. On occasion there was confusion as to whether this is combined income.	Include a question that considers participants occupation. State whether the question refers to personal or combined income.

Qualitative Analysis of Respondent Comments

For statistical analysis, qualitative responses to the questions “Are there any particular environmental issues that concern you?” and “If yes which is the most important one?” were quantified according to specific theme. Sixty-eight percent of participants surveyed commented that they did have a specific environmental issue that concerned them. These responses have been considered below, with a brief discussion of the specificities of participant responses and frequencies. The theme of Land Degradation was divided into a number of sub-categories due to the diversity of land issues salient to participants.

Themes

The most commonly raised theme related to Water Conservation, Usage and Management, with 19 issues raised under this category. The theme, Salinity was the second most commonly reported (12) and was particularly salient amongst Merredin participants. The chart below depicts the frequency of the other themes raised.



Water Conservation, Usage and Management

Issues concerning the conservation, usage and management of water were diverse. Water issues raised related to; the community, the wider society (national and international) and emphasized the theme of water as a complex, far reaching environmental issue. The frequency of “water” as participants’ key environmental concern was most prevalent. This frequency appears to convey awareness within communities about water impacts, however there is limited awareness of the interconnectivity and accountability of communities and their contribution to river issues. For example one participant commented on the pollution of the Swan River with specific criticism of industry located near the river. For this participant, industry was perceived as the main contributor to pollution, while impacts due to other less directly perceived sources, such as farming and urban fertilizer use were dismissed. Specific water issues raised by respondents are listed below.

- Water Pollution
 - Ground water contamination
 - Chemical spills in or near water ways
 - Concern over the pollution of ground water (Hamersley)
- Waste
 - Household (stormwater impacts and)
 - Industrial (excessive use by cotton and rice industries)
 - Farming

Salinity

Salinity issues were primarily discussed by residents of Merredin where it was described by one participant as being “a big issue here”. The issue was prevalent to participants in both the farming district and the town which suggested its wide reaching significance. Specific concerns and messages conveyed by participants related to salinity are listed below.

- There were concerns over the severity of salinity with the situation described by one participant as being “in my own backyard. Bricks get a white film”. Another stated that the town was doing a lot about it that they had a strategy in place, along with bores and experiments to manage the situation. Further, it was stated that if they “want to save the town, have to get salt down”. Another resident of Merredin stated that “the prognosis was bad” and that she was “Seeing it here in the town”. These messages from the community suggest fears regarding Merredin’s long term sustainability.
- Community activities have been conducted in Merredin in an effort to address this issue e.g. community tree planting
- There were concerns regarding overclearing for farming. Specifically, the concerns related to the implications of clearing on the rising water table.

Air Pollution

Air pollution issues were raised by several participants. Specific concerns related to prescribed burning, emissions from wood burning stoves and urban pollution and associated health impacts.

Climate Change

Climate change and the associated impacts of global warming were raised as a concern by some participants.

Artificial Contaminants

The theme of Artificial Contaminants referred to participants concerns over the misuse and inappropriate disposal of artificially made products. For example, particular contaminants included plastic bags and packaging and chemicals used on the garden and lawn.

Flora and Fauna Conservation

Flora and fauna conservation primarily related to impacts on native flora due to deforestation and specific concerns for Western Australia’s old growth forests. There was reflection by one participant on historical trends with specific concern over the significant decrease in forest area since European settlement.

Interestingly, the burning of vegetation was conceptualized as a single issue, with no reference to the consequential impacts on atmosphere and climate. However, this issue was framed by some participants as being an air pollution issue. This observation introduces an interesting dynamic in the manner that people conceptualise environmental issues. There appears to be a very simplistic understanding of issues, where issues are framed in terms of single cause and single effect.

Other

The theme Other related to issues that were less frequently raised by participants and included the following categories:

- Environmental Management
- Drought
- General Environmental Concern
- Land clearing and development
- Power Consumption
- Erosion