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PUBLIC PERCEPTIONS OF WATER REUSE IN SANTA CLARA COUNTY, CALIFORNIA

A Thesis

Presented to

The Faculty of the Department of Environmental Studies

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree of

Masters of Science

by

Junlin Linda Liu

August 2006

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ABSTRACT

A STUDY OF PUBLIC PERCEPTIONS OF WATER REUSE IN SANTA CLARA COUNTY, CALIFORNIA

By Junlin Linda Liu

As population increases in California, the demand for potable water will also increase. Water reuse plays a significant role in safeguarding California's water supply. However, public acceptance and perceptions of water reuse can hinder water reuse projects from being successfully implemented. This study, which uses quantitative analysis, investigates public perceptions on water reuse and identifies correlations with demographic characteristics. The results indicate the public is most concerned about health-related risks of recycled water, and that this concern is statistically correlated with gender, age, level of education, and residing with children under the age of 18. In addition, the public wants to know more about the health implications and food safety of recycled water when it is used for irrigating food crops.

ACKNOWLEDGEMENTS

As the Chinese proverb says, "Nothing is difficult to the man who will try."

In this lengthy research process, I have learned so many things that I never imagined doing. This path is filled with challenges and I owe many individuals for their support and caring.

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This would not be possible without endless love and patience from everyone in my family. Thanks Annie and Kien for believing in me when I had doubts. I always appreciated your prayers and support. Thanks to Mom and Dad for your patience and understanding through the years even though you did not know what I was going through.

Lastly, I would like to thank all of my friends, co-workers at the Santa Clara Valley Water District, and colleagues from the Environmental Studies department for listening to me when I was frustrated with the process. Your comforting words or simply a hug refueled my energy each time.

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Problem Statement

An adequate water supply is essential not only to sustain life, but also to fuel economic growth and to improve the quality of life in a region. California's current population of 35 million is expected to increase by 17 million by 2030, a 50% increase (DWR, 2003). With this increasing population, the demand for potable water will also increase. In addition to population growth, the semi-arid to arid climate in California creates an enormous challenge for the state to meet water demand. Hydrologic conditions vary dramatically across California. The average annual rainfall, for example, in the Sierra and Cascade Mountain Ranges is 95 inches while the Central Valley receives less than five inches a year (Recycled Water Task Force, 2003). The unique topography of California also makes it difficult to supply water. Although the northern portion of the State receives its water supply from snowmelt and runoff from neighboring mountain ranges, the southern region relies heavily on imported water from northern California and the Colorado River through hundreds of miles of aqueducts.

The traditional approach of constructing large-scale infrastructure to deliver water to remote locations and store it for future uses is no longer feasible in California. Therefore, an array of innovative types of management strategies and technologies has been developed to balance the water supply and demand in the various regions of the State. With advancement in technology, the viability of reusing water increases. Water and public utility agencies in the State have gradually begun to incorporate water reuse projects into their water portfolios as part of an integrated approach to water management.

The California Department of Water Resources (DWR) (2003) estimates that recycled water, which is municipal wastewater that has been treated and purified to be as clean as standard drinking water, has the potential to free up potable water demands for 30 to 50 percent of the additional 17 million Californians. Thus, the potential of recycled water enables the State to meet the rising demand due to population increase and ensures long-term reliability of water supplies for the State.

In spite of the potential benefits that recycled water could bring to the state, public opposition may hinder the development and implementation of water reuse projects. Water and public utility agencies perceive the role of public perception and acceptance as an essential ingredient of success for any water reuse project. Many water reuse projects in California and other parts of the world have been deferred indefinitely due to strong public opposition (Mills, 2004). In order for the State to benefit from using recycled water, a greater understanding of community attitudes is necessary. The main objectives of this research are to understand better public perceptions of water reuse and to investigate whether demographic variables are correlated with those perceptions.

SIGNIFICANCE OF RESEARCH

Since California began to use recycled water, research to address public acceptance on water reuse has not been studied extensively. Water reuse will play a significant role in safeguarding the State's future water resource supply. Unfavorable public acceptance and perceptions for water reuse projects can hinder projects from successful implementation. Thus, this study provides useful information for water and public utility agencies to address concerns and perceptions of people with different demographic characteristics as they relate to water reuse. Results of this study can be further utilized to design more effective recycled water education materials and outreach campaigns for specific audiences, such as youth and the elderly.

Operational Definition of Recycled Water

Water reuse in this report refers to the use of recycled water. Recycled water is municipal wastewater that has been purified through a high level treatment. This processed water is treated by strict standards set by the California Department of Health Services. The general levels of treatment include primary, secondary, and tertiary. Although it is not required for all wastewater to go through all three treatments, tertiary-treated water is recommended for uses with high level of human contact. Appendix A outlines detailed steps involved in each treatment process and Table 1 compares the recycled water quality with potable water.

Recycled water uses have direct and indirect purposes, which are important in understanding the public health issues and acceptance concerns regarding water reuse (DWR, 2003). According to the Department of Water Resources (DWR), most direct reuses are planned. This involves direct reuse by delivering recycled water through pipes to the users (DWR, 2003). Indirect reuse, which is often unplanned, usually means downstream reuse is an incidental result of effluent discharge. There is no prior arrangement that the producer of treated wastewater would remain in control of the quality of effluent discharge for downstream reuse (DWR, 2003; Wong and Gleick, 2000).

Table 1. Comparison of recycled water and potable water quality

Water Quality Parameter	Units	Recycled Water[1]	Potable Water[2]
Alkalinity (as CaCo3)	mg/L	185	106
Hardness (as CaCo3)	mg/L	253	119
Nitrate (as Nitrogen)	mg/L	10.9	2
Nitrite (as Nitrogen)	mg/L	<0.08	ND[3]
pH	pH units	7.0	7.6
Total Dissolved Solids	mg/L	685	262
Turbidity	NTU[4]	0.9	0.05
Arsenic (As)	mg/L	0.0012	ND
Cadmium (Cd)	mg/L	<0.0001	ND
Calcium (Ca)	mg/L	49.5	29
Chloride (Cl)	mg/L	172	25
Total Chromium	mg/L	0.05	ND
Copper (Cu)	mg/L	0.0036	ND
Lead (Pb)	mg/L	0.0012	ND
Magnesium (Mg)	mg/L	29.6	15
Mercury (Hg)	mg/L	0.0000021	ND
Nickel (Ni)	mg/L	0.0061	ND
Phosphate (PO4)	mg/L	3.78	1.44
Potassium (K)	mg/L	13.4	2.2
Sodium (Na)	mg/L	132	42
Sulfate (SO4)	mg/L	113	59.5
Zinc (Zn)	mg/L	0.036	ND

[1] South Bay Water Recycling. Retrieved on 7/6/06 from http://www.sanjoseca.gov/sbwr/water-quality.htm. The data are the monthly average between January and February in 2006 from the San Jose/Santa Clara Water Pollution Control Plant.

[2] Santa Clara Valley Water District. Retrieved on 7/6/06 from http://www.valleywater.org. The data are from January 2006 from Rinconada Water Treatment Plant (treated effluent).

[3] ND = Not Detected

[4] NTU = Nephelometric Turbidity Units (measure of the suspended material in water)

RELATED RESEARCH

California's Experience

The concept of water reuse is not a new phenomenon. Historically, recycled water was used primarily in the Central Valley for agricultural irrigation, as a means to conveniently dispose of treated wastewater. In recent decades, however, water management tools have promoted water reuse as a cost-effective way to meet the demand for potable water supply, especially during water shortage periods and in water-deficient regions (DWR, 2003). Thus, uses have gradually changed from rural settings to urban applications like landscape irrigation.

Compared to other parts of the world, California has been a pioneer in water reuse. Since the early 1900s, the state has implemented recycled water projects in over 35 communities, mainly for farm irrigation (DWR, 2003). In 1970, a statewide estimate indicated that nearly 175 thousand acre-feet of municipal wastewater was reused. This number increased to 402 thousand acre-feet by 2000. The Department of Water Resources (DWR) estimates that current recycled water use ranges from 450 to 580 thousand acre-feet per year (DWR, 2003). To date, over 230 recycled water projects are in operation in the State. Current applications and their proportions of recycled water are indicated in Figure 1.

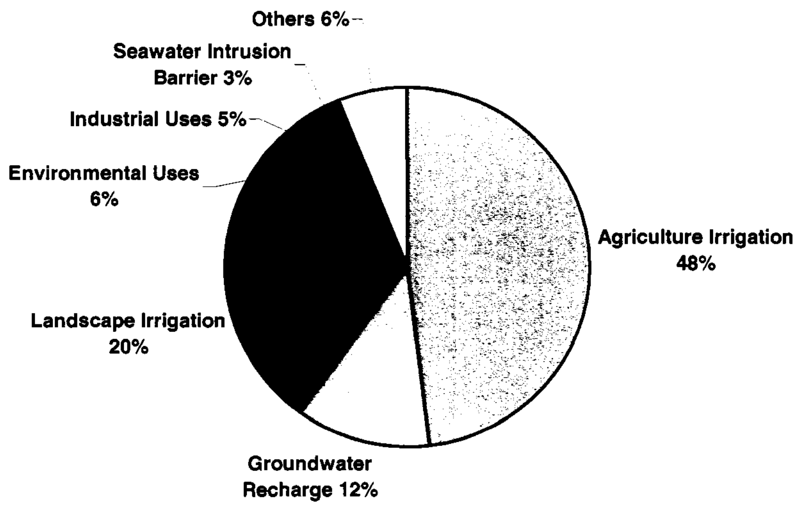

Figure 1. Types of Recycled Water Use in California.

Source: State Water Resource Control Board, 2000.

The majority of the water reuse projects have been for non-potable purposes, and only four projects were designed for indirect potable uses (Recycled Water Task Force, 2003). Non-potable reuse applications are mainly for agricultural and landscape irrigation (e.g., golf courses and public parks), and for industrial applications. In general, local communities have been supportive of these projects. The public, however, has been opposed to indirect potable reuse projects because of the possible perceived health risks associated with the ingestion of products that were in contact with recycled water (Recycled Water Task Force, 2003).

Case Study Example

Vigorous public opposition and lack of public support has caused decision-makers to defer or reject many reuse water projects. One example is the Dublin San Ramon Services District's Clean Water Revival Project. Proposed in the mid 1900s project proponents planned to process recycled water, using recycled water treated beyond tertiary treatment, and inject it into the local groundwater aquifer. The project had several potential benefits: 1) increasing water supplies, 2) reducing salt concentration in current groundwater, and 3) reducing demand of water from Livermore Valley to San Francisco Bay. Despite its expected benefits, the "Toilet to Tap" headlines throughout local newspaper and media brought concerned citizens to meetings at city council and the groundwater basin manager's boardroom. Environmental groups argued that use of recycled water could stimulate growth and development. Faced with strong public opposition, the Dublin San Ramon Services District currently serves advanced treated[5] water for landscape irrigation only (Recycled Water Task Force, 2003).

[5] using microfiltration and reverse osmosis technology

Guidelines and Regulations

Since recycled water is used in a wide range of applications, numerous regulations for non-potable water reuse are in place to protect public health. In 1918, California adopted its first water reclamation and reuse standards for agricultural irrigation. Since then, the state has revised its water reuse standards to address wastewater treatment technology advancements and increase water reuse applications (Crook and Surampalli 1996). Today the State Water Resources Control Board regulates the production, delivery, and applications of recycled water through its nine Regional Water Quality Control Boards (Wong and Gleick 2000). The Department of Health Services has developed guidelines called Title 22 Wastewater Reclamation criteria that can be found located in the California Code of Regulations (DHS, 2004). Title 22 allows the use of recycled water for agricultural irrigation, groundwater recharge, environmental enhancement, industrial applications, and other uses, depending on the level of water treatment (Wong and Gleick, 2000). No states have developed comprehensive regulations and guidelines for all potential uses of recycled water due to the greater potential risks and the complexity of the issue (Crook and Surampalli 1996, Recycled Water Task Force, 2003). However, regulations for indirect potable reuse are being developed in California (Crook and Surampalli, 1996).

Public Perceptions of Recycled Water

The success of all water reuse schemes depends on public acceptance. Generally, water and public utility agencies are more inclined to investigate the financial and technical feasibility of a water reuse project rather than to examine the issue of public acceptance. However, without public support water reuse projects often fail to gain approval. Thus, it is essential to understand public perceptions and attitudes toward water reuse to ensure that proposed recycled water projects receive fair opportunity for public review in the decision-making process. Through literature research, core themes have emerged which may help explain the public's attitude towards water reuse:

- Perceptions of health-related risks
- Knowledge of recycled water source and treatment processes
- Trust in management of local public utilities
- Concerns for cost of recycled water

Health-related Risks

Health-related risk is a factor of concern that contributes to people's acceptance of recycled water mainly because it directly affects public health. In Jeffrey and Jefferson's study (2003), the majority of respondents (89%) have no objections to water recycling as long as human health safety is not compromised. A Sydney Water Study in 1999 concluded that public health issues and the risks involved in using recycled water for cooking or drinking are the main concern. In addition, 92% of respondents from this study expressed concerns about the safety of children using recycled water. More than half of the respondents (59%) are concerned that the safety of recycled water cannot be guaranteed (Po et al., 2003).

In Queensland, Australia, a survey was distributed to recycled water stakeholders including local government, the providers, and current and perspective recycled water users. The study focused on recycled water quality concerns, and the results indicated that nearly 79% of respondents were concerned about water quality. Some respondents were concerned about the variability of recycled water quality from its distribution point to its final uses (Higgins et al., 2002). In addition, Higgins et al. (2002) found that 33% of respondents would like further research to be done to address recycled water quality issues. This statistic implies that part of the concern could be alleviated through public education and by establishing monitoring programs (Higgins et al., 2002).

Recycled Water Source and Treatment Processes

The source and treatment process of recycled water are also influential factors in determining the public acceptance of recycled water (Jeffrey and Jefferson, 2003; Higgins et al., 2002). Studies in the United Kingdom (UK) confirmed that the public is more inclined to accept reuse if the water originates from their own household than from a public source (Jeffrey and Jefferson, 2003). Because recycled water comes from a public source, people are concerned about the perceived health risks associated with this type of water. Participants of their study were simply concerned about the potential health impacts of water treatment and processes (Po et al., 2003).

Competency in Local Management

Trust in local public and water utilities can also influence the perceptions of water reuse. Hurlimann and Mckay (2004) indicated that as trust in water and sewage management increased, so did the acceptance of investing in recycled water technologies for personal uses. Lack of trust in management of public agencies is crucial in explaining why citizens are pro-environment but reluctant to take actions to support environmental decisions (Johnson and Scicchitano 2000). In a study on public perceptions, Frewer et al. (1996) found that when communicating food-related hazards, people trust certain institutions they perceive to be honest, reliable, responsible, accurate, and focused on public welfare.

Cost of Recycled Water

The cost of recycled water can also influence how people perceive water reuse projects. The public is responsible for financing the development of water reuse projects (Bruvold, 1988). From earlier studies, Bruvold (1988) identified treatment and distribution costs as two of the factors to affect public perception. This also coincides with the National Water Quality Management Strategy (NWQMS) in Australia, which suggested that the cost of recycled water is a significant determinant for public acceptance. In general, people expect to pay less for using recycled water since it is considered to be of a lower quality than potable water (Po et al., 2003).

Specific Application of Recycled Water

Studies indicated that public support for water reuse might depend upon specific uses. In general, the public appears to favor water reuse projects that conserve potable water, provide environmental enhancement, offer public health protection, and ensure cost effective treatment and distribution processes (Hartley, 2003). Nevertheless, the public becomes less accepting of reuse when projects become more specific to a community and more personal in nature. This finding is consistent with several other water reuse studies. Bruvold and Ward conducted a study in 1972, for example, to analyze public opinion on ten communities in California. This study concluded that public acceptance of recycled water is associated with the specific purpose of the uses (Al-Khalifa et al., 1992). Olson and Pratte (1978) had similar conclusions when a survey conducted in Irvine, California measured public opinion and attitudes towards the expanded use of recycled water. All these findings reveal that, as long as the uses of recycled water are not in the home, respondents are in favor of using recycled water instead of using the existing water supply (Al-Khalifa et al., 1992). Al-Khalifa (1992) concluded that most respondents were opposed to using recycled water if more bodily contact is involved.

Socio-Demographic Factors

Understanding areas of concern about water reuse is certainly useful as reference for public utilities to design content on their education and outreach materials. However, investigation and identification of demographic variables in correlation with public perceptions may offer a more effective way to present or deliver the educational information. The Recycled Water Task Force (2003) recommended that water agencies consider demographic issues and audience analysis for their outreach efforts. A few studies have investigated demographic variability, (such as age, water reuse knowledge, education level) and public perception.

Georgantzis and Tsagarakis (2003), for example, studied farmers' willingness to use recycled water for irrigation in Crete, Greece. The researchers included the definitions of wastewater, wastewater treatment plants, and water treatment processes in the survey. In addition, an information session was conducted during this study on wastewater recycling. Before and after the session, the following question was asked to evaluate the effectiveness of the session: "Would you use recycled water for the irrigation of your crops?" The analysis revealed that willingness to use recycled water increased after the session. Respondents indicated their willingness to use recycled water with "great certainty" increased from 19.1% to 22.3%, and from 26.5% to 35.6% on "very likely." The result of this study confirmed that the public's understanding of environmental issues has a strong correlation with income and education levels. The educated and wealthy respondents expressed concern about environmental issues. Additionally, the researchers concluded that the informative session on recycled water led to a strong, positive impact on public willingness to use recycled water (Georgantzis and Tsagarakis 2003). Although the study only involved 250 participants, results support the claim that public education and outreach are necessary for increasing support of recycled water applications.

Al-Khalifa et al. (1992) surveyed public awareness and knowledge relating to recycled water in the State of Bahrain. Results indicate that perceptions strongly depend on age and level of education. Respondents of 20-40 years of age were more knowledgeable of water reuse compare to other age group. Dissimilarly, Jeffrey and Jefferson (2003), found that there was no correlation between age or gender toward water reuse perceptions. Their study, conducted in the UK, also explored the public's attitude toward water recycling. With a sample size of approximately 300 respondents, results indicate that most people support water recycling as a concept. In addition, they found no significant variation in public support of "greywater" reuse (where the source of water is from one's own home) across gender, age, or socio-economic groups.

In contrast, Hamilton and Greenfield (1991) conducted a study in Australia and suggested that without prior exposure to negative reuse information, a male with a higher level of education was more likely to accept potable reuse. Surveys in California and Colorado indicated that older women tend to be less accepting of potable water reuse (Hartley 2003). McKay & Hurlimann (2003) hypothesized that the greatest opposition to water reuse schemes would be from people 50 years and older.

Given the differing results in studies conducted to determine the relationship between demographic variables and perceptions of recycled water, it is clear that further research is vital to our understanding. Additionally, while the need to develop awareness and education programs on water reuse is recognized worldwide, no study has been done to identify how demographics are associated with water reuse perceptions as a basis for designing effective educational materials for the appropriate audience.

Guadalupe River Park Master Plan

While perceptions of recycled water uses require further and in-depth research, an innovative type of recycled water application is being proposed which could create another challenge for public acceptance. In 2002, the City of San Jose approved the Master Plan of the Guadalupe Gardens, which calls for a mixed-use of public gardens and open spaces on a 120-acre site near the downtown San Jose area, adjacent to the Guadalupe River Park. Some elements of the Guadalupe Gardens are already in place, for example, the Heritage Rose Garden, the Historic Orchards, and the Courtyard Garden. The future community garden will be an additional element. Approximately 2.2 acres of land has been designated for community garden uses. The Master Plan also mandates that the Guadalupe Gardens be irrigated with recycled water. Currently the City of San Jose manages nineteen community gardens throughout the city and they are all serviced by potable water.

The City of San Jose is one of the beneficiaries of the South Bay Water Recycling Program, a non-potable water recycling program that supplies recycled water to parts of San Jose, Santa Clara, and Milpitas. Recycled water is transported through an 80-mile system of pipes and services over 450 public and private sector customers (City of San Jose Annual Report, 2003/2004). Recycled water is broadly used throughout the city of San Jose in both the public and private sectors mainly for turf irrigation at business parks, public parks, golf courses, and schools, as well as for industrial purposes. Nevertheless, using recycled water in a community garden is a new application in Santa Clara County as well as in California. Thus the proposed community garden, if approved, will be a unique experience and educational opportunity for the public towards recycled water uses.

RESEARCH QUESTIONS

This study aims to determine if any statistically significant correlation exist between public perceptions of water reuse and demographic variables. Specifically, this study answers the following research questions:

1. How concerned is the general public about the following aspects of recycled water?
   - Health-related risks
   - Source of water and treatment process
   - Competency in local management of public utilities
   - Cost

2. How do the abovementioned four aspects of recycled water correlate with the following?
   - Age
   - Gender
   - Level of education
   - Residing with children under the age of 18

3. What does the general pubic want to learn more about recycled water for growing food crops?

4. How does public interest in recycled water (from Research Question 3) correlate with:
   - Age
   - Gender
   - Level of education
   - Residing with children under the age of 18

5. What is the level of support for the following applications of recycled water: public uses, industrial uses, and personal uses?

HYPOTHESES

Based on extensive literature review, findings on the support of recycled water uses and their correlations with demographic variables seem inconclusive. This study tested the following hypotheses to contribute additional information to previous findings:

H_1: Support for recycled water uses in industrial and public applications will be higher than support for personal use.

H_2: Respondents with a higher level of education will be more likely to support the use of recycled water.

H_3: The younger the age of the respondents, the more likely they will be to support uses of recycled water in general.

H_4: Females will be less likely to support the use of recycled water in general.

METHODS

This study employed a quantitative, secondary analysis method to re-evaluate the data collected from a survey done by the Friends of Guadalupe River Park and Gardens (The Friends). A secondary analysis, by definition, is a further analysis of an existing data set that has been analyzed or compiled in some form already (Babbie, 2004). The original data analyses focused on data pertaining to public perceptions on community gardens. The data analyses of this study address a broader scope of public perceptions. Brief descriptions of the study site and data collection for the initial study design are described below, followed by a series of quantitative analyses.

Study Site

The study site is within approximately three miles of the Guadalupe Community Garden. Previous studies indicated that this is the average distance that plot-holders travel typically to their selected garden site (Young, 2002). The sampling population extends to the south and east of the proposed garden and to both the north and west are other cities (Asquith, 2005). Three major freeways, Highway 880/17 to the west, Interstate-280 to the south, and Highway 101 on the east, form a triangular boundary of the site (see Figure 2). The actual garden is near the northern peak of this triangle, as indicated by the pointer.

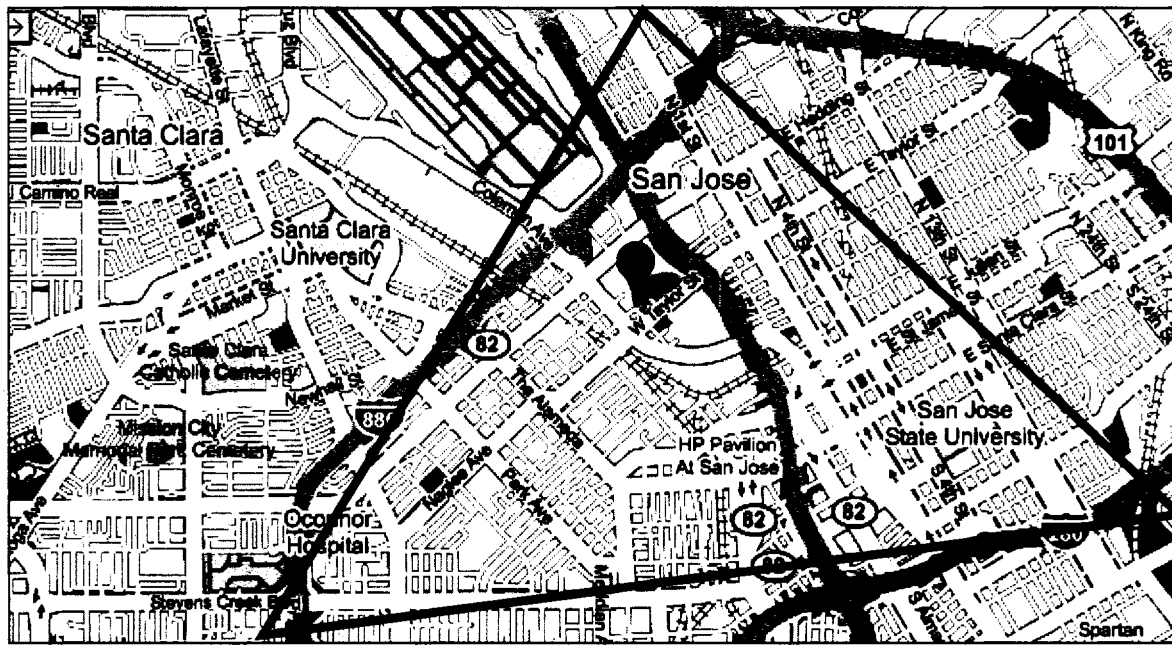

Figure 2. Main sampling boundaries for study site.

Source: www.maps.google.com (2006).

<u>Data Collection</u>

The key instrument for this study was a survey. I coordinated with the following individuals to develop a self-administered questionnaire (SAQ), attached in Appendix B:

- Staff of the Friends of Guadalupe River Park and Gardens
- Technical advisory committees of the Guadalupe Community Garden project
- Professor David Asquith, Department of Sociology at San Jose State University
- Staff from the WateReuse Foundation

Respondents were asked to read and sign the consent form, and then complete the questionnaire (see Appendix C). The goal of this questionnaire was to understand the attitudes of potential garden users—any resident of San Jose—prior to the project. Once the Garden has been approved and becomes available, individuals who sign up for a plot in the Guadalupe Community Garden will be given a survey to assess their attitudes prior to their use of the garden and then again after their experiences of using recycled water to grow food crops. The survey responses are intended to assist the Friends in determining appropriate vehicles for public outreach to the local community, and to develop media messages for public outreach campaigns (WateReuse Work Plan, 2004).

With approval from the Institutional Review Board from San Jose State University, approximately 3,000 surveys were distributed (both English and Spanish) in the summer of 2005. The survey was voluntary and anonymous. Each respondent was asked to read and sign the consent form was attached in the front of the survey. Also included in the consent form is a brief definition of recycled water (see Appendix C). Depending on the method of contact, participants could complete the survey online, over the phone, in a face-to-face interview, or by mailing it in.

Due to the close proximity of the proposed garden site to downtown San Jose, the Friends primarily aim to attract downtown residents living in high-density housing. One purpose of the survey was to compare whether perceptions vary among respondents with connections to the community program and respondents without connections. However, the respondents from this survey resided throughout San Jose, which included areas beyond the sampling boundaries described in the study site section. Nevertheless, the responses from these individuals are still valuable. These respondents are assumed environmentally conscious because, for example, they are either members of the Friends, attendees at environmental-related workshops, or customers at farmer's markets. Thus they would have more exposure to environmental topics (e.g., recycled water uses) and would be more likely to consider signing up for a plot in the new community garden. Thus, the actual study consisted of the following groups of individual:

- Current and former participants of the City of San Jose's Community Gardens Program
- Individuals who are currently on the waiting list for the City of San Jose's Community Gardens Program
- Members of the Friends
- Volunteers and contacts of individual in the Friends' database
- Users of local parks and recreation areas
- Master Gardeners of Santa Clara County
- Customers of home improvement stores, farmer's market, and nurseries

After researching for local stores and events, the sampling locations for this study are as follows:

- Local parks and recreation areas within the sampling boundaries
- Workshops and classes offered by the Santa Clara Valley Water District and the Friends
- Community centers, small retail centers, and at appropriate local festival
- The Friends' webpage

The original data set for this study was obtained from Professor David Asquith in August 2005, who initially entered the survey responses into the Statistical Package for Social Sciences (SPSS) software program. Data analyses of this research are based on the 1,052 responses received as of October 2005.

Data Analysis

I conducted both quantitative and qualitative analyses to understand public perceptions and attitudes towards water reuse, and to investigate their correlations with demographic factors.

Coding and Index

For quantitative analysis, I used SPSS to perform a series of statistical tests to analyze the data. In SPSS numerical coding is essential to transform raw data into a standardized form (Babbie, 2004). Appendix D lists the coding scheme for demographic variables, which are also the independent variables used in this research: age, gender, level of education, and residing with children under 18. I selected the dependent variables that are specific to my research questions. Both Tables 1 and 2 specify and define the dependent variables. For Research Question 1, I selected the four categories of concern as dependent variables: 1) health-related risks, 2) source of water and treatment processes, 3) competency in local management of public utilities, and 4) cost. Participant responses to questions on the survey make up the dependent variables (e.g., Survey Question 28, whether recycled water could cost extra money).

In some cases, I combined responses from several survey questions into a single measure because they shared similar characteristics in the same category. For instance, responses from Survey Questions 19 (how concerned would you be about where the water comes from) and Survey Question 22 (how concerned would you be about the reliability of the water treatment process) make up the dependent variable on "source of water and treatment processes." Thus, I created a new variable for the combined observations. This type of composite measure is common in quantitative research and it can give researchers a more comprehensive and more accurate indication (Babbie, 2004). Table 2 presents various categories of concern as the dependent variables, and outlines specific survey questions used to create these new composite variables. For this study, concepts of "Health-related risks" and "recycled water source and treatment" are characterized by data from more than one survey question. The remaining two categories on "competency in local management" and "cost" are based on responses to a single question from the survey. Appendix E lists the survey questions used for this research.

Table 2. Dependent variables, definitions, and coding scheme for Research Question 1

"How concerned is the general public about various aspects of recycled water?"

Category of Concern	Survey questions used to address Research Question 1*
Health-related risk	o Virus, bacteria, or germs in water o Pesticides or toxic material in water o Long-term unknown health effects o Effects on certain people (children, pregnant women, elderly)
Recycled water source and treatment process	o Where the water came from o The reliability of the water treatment process
Competency in local management of public utilities	o The people in charge knowing what they are doing
Cost of recycled water	o Whether it could cost extra money

*Coding Scheme:
0 = Not at all Concerned; 1 = Slightly Concerned; 2 = Somewhat Concerned;
3 = Very Concerned; 4 = Extremely Concerned.

Table 2 presents the dependent variables that measure the level of support on various applications of recycled water. "Public use" is the only variable with multiple questions. The remaining two variables, "industrial uses" and "personal uses," are based on single questions from the survey because no other survey question seems to share the same theme.

Table 3. Dependent Variables and Definitions for Research Question 5

"What is the level of support for various applications of recycled water use?"

Dependent Variable	*Relevant Survey Questions**
Public Uses	o Watering public parks, lawns, and gardens o Public fountains, exhibits, displays o Public toilets, for flushing
Industrial Uses	o Industrial, manufacturing purposes
Personal Uses	o Washing clothes, and Laundromats

*Coding Scheme:
0 = Strongly Oppose; 1 = Oppose; 2 = Not sure; 3 = Support; 4 = Strongly Support.

For variables with multiple questions (e.g., public uses), the average score from all related responses is the value for the new composite variable. To ensure valid measurement, I performed a reliability analysis to examine the internal consistency and agreement between items. To quantify reliability, I used the Cronbach's alpha[6], which is the mostly commonly used reliability index for

[6] $\alpha = \frac{N \cdot \bar{r}}{(1 + (N-1) \cdot \bar{r})}$ N = number of items; $\bar{r}$ is the average inter-item correlation among the items.

variables of this type. Cronbach's alpha measures how well a set of items (or variables) measures a single one-dimensional construct (e.g., health-related risks). The values for Cronbach's alpha range from 0 to 1, and values between 0.70 and 0.80 are considered acceptable (Norusis, 2005). In this research, 0.70 is the baseline value for Cronbach's alpha.

The survey questions that measure respondents' attitudes are based on a five-point Likert scale. Questions pertaining to the level of concerns range from "not at all concerned" to "somewhat concerned" to "extremely concerned." For the questions that measure the level of support for recycled water use, responses ranged from "strongly support" to "not sure" to "strongly oppose."

Descriptive Statistics

Descriptive statistics[7] and frequency tables answer Research Question 1 (four aspects of recycled water) and Research Question 5 (what is the level of support in public, commercial, and personal uses). I examined the responses with the highest combined percentage from the top two selections (i.e., "extremely concerned" and "very concerned")[8].

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[7] Descriptive statistics generally include the *total number of observations, mean, median, standard deviation, and minimum and maximum values.*

[8] Note that at random occurrence, the chance of selecting one of the five response choices is 20%, thus the random chance of getting the top two concerned selection adds up to 40%.

Multiple Regression Analysis

To examine the statistical relationship between areas of concern with demographic variables (as stated in Research Question 3), I applied a multiple regression model[9]. More specifically, I used the least-squares method[10]. A linear regression analysis can predict the values of a continuous, dependent variable from more than one continuous, independent variable (Norusis 2005). One of the assumptions of the linear regression model is the linear relationship between the dependent and independent variables (Long, 1997). The dependent variables in this research are ordinal in nature, and their discreteness violates the regression assumptions of normal distributions of error with continuous variables. This violation, however, does not conflict with the data analysis in this research. Linear regression models compute coefficients (β) that indicate the change on the dependent variable when the independent variable changes by one unit and all the other independent variables remain constant (Norusis 2005). The affect of a

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[9] The general formula for a linear regression model is shown here (Long, 1997): $\gamma_i = \beta_0 + \beta_1 X_{i1} + \ldots + \beta_k X_{ik} + \ldots \beta_K X_{iK} + \varepsilon_i$, where γ is the dependent variable, i is the observation number, β_1 through β_K are parameters that indicate the effect of a given X on γ, β_0 is the intercept which indicates the expected value of γ when X's equal to 0, and ε is random error component. For example, predicted score = $\beta_0 + \beta_1$ (age) + β_2 (gender) + β_3 (level of education) + β_4 (residence with children under 18) + ε.

[10] It minimizes the sum of the squared deviations and finds the best fit for a series of measured data (Long, 1997).

change of direction (positive or negative) in the independent variables rather than their magnitudes answered the research questions and explained hypotheses of this research. The focus of this research is to examine whether demographic variables are correlated perceptions of water reuse. For instance, this research hypothesized that females will be less likely to support the use of recycled water in general (Hypothesis 4). If the coefficient (β) from multiple regression analysis is negative, and the coding for female is 2 and male is 1, then the negative sign of coefficient indicates a male is more likely to support uses of recycled water than a female in general. The coefficient offers the directionality of the data and address research questions of this research, thus the linear regression model is appropriate for purpose of this research.

Coding of Qualitative Data

Coding for core themes addressed the third research question, "What does the general pubic want to learn more about recycled water for growing food crops?" I transferred all written comments, word for word, from the returned surveys into a spreadsheet with the corresponding survey number. Volunteers from the Friends, who are fluent in Spanish, translated the written comments in Spanish into English prior to data entry. I hand-coded the data, using an inductive method, and allowed core themes to develop based on observations. An inductive approach attempts to generate a theory based on patterns, themes, and common categories derived within the observational data (Babbie, 2004). During the coding process, I initially reviewed the content of the written comments, and documented key points from the data. I then performed a focused data coding to review the key points and assign a numerical value to define its category, e.g., "health and food safety" and "water source and treatment." I recorded surveys with no writing in this section as "missing" category. A comment such as "none" is captured in a separate category. Comments that were repeated ten or more times form a new category, and the remaining items are classified in the "miscellaneous" category. Finally, I input the numerical coding into SPSS for statistical analysis.

Multinomial Logistic Regression

In addition to the multiple regression analysis, I also conducted a multinomial logistic regression[11]. A multinomial logistic regression can correlate

[11] The logistic regression model is shown here (Long, 1997):

$$\log\left(P(\text{category}_i)/P(\text{Category}_J)\right) = B_{i0} + B_{i1}X_1 + B_{i2}X_2 \ldots + B_{ip}X_p$$

The quantity to the left of the equal sign is called the Logit, and this model is called the baseline category Logit. It calculates the log of the ratio of the probability of being in that group compared to being in the a nominal dependent variable (i.e., a variable with categorical values that cannot be ranked), to a set of independent variables (Norusis 2004). I applied this method to answer Research Question 4, "how does the area of concerns correlate with age, gender, level of education, and residing with children under 18?" The dependent variable for Research Question 4 is categorical because they are themes derived base on observations and cannot be ranked. Thus multinomial regression analysis is suitable in explaining the relationship between the public's concerns about recycled water and demographic variables (as stated in Research Question 4).

For both multiple linear regression and multinomial regression models, the Pearson Chi-Square value (*p* value) determines the level of significance. A low significance value (typically 0.05 or below) indicates that the relationship between the two variables is statistically significant. A high significance value, (i.e., higher than 0.05), indicates that the statistical relationship between the two variables is not significant.

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baseline group (reference group). J = possible values from the dependent variable. The equation here demonstrate the probability for the i^{th} category with J as the baseline category.

Hypothesis Testing

This research tested four hypotheses to confirm or reject findings from previous studies. Two statistical methods, descriptive statistics (for Hypothesis 1) and multiple regression analysis, test the remaining three hypotheses. The last three hypotheses test the correlation between a specific demographic variable and the level of support for recycled water uses in general. In order to perform a multivariate linear regression, only a single dependent variable is allowed in SPSS. Thus I created a new variable to represent all uses of recycle water, using an index to composite all responses to questions relating to the level of support for recycled water. The new variable, "general uses of recycled water," became the dependent variable for hypotheses testing purposes.

Limitations

This research has two main limiting factors. First, the original sampling method was not completely uniform because more than one method was used (mailing, telephone, face-to-face delivery of surveys, and online). Second, the intended population of plot-holders for the proposed garden was the downtown residents who live within three miles of the site. However, the sampling locations and methods did not explicitly target the downtown population. Nevertheless, as such a large-scale recycled water survey has never been done before in Santa Clara County, the results from this study are still useful to local water agencies and entities to address issues of public perception on water reuse. These results can assist water and public utility agencies in understanding how the relationship between concerns and perceptions of water reuse may vary with demographic factors. The results also contain recommendations that are valuable for the development of recycled water curricula.

STUDY RESULTS

Correlations between Concerns about Recycled Water and Demographic Variables

The four categories used to analyze the public's concern on recycled water are as follows: 1) health-related risks; 2) source and treatment process; 3) competency in local management; and 4) extra cost. Table 4 shows the summary of descriptive statistics for these four categories. The minimum and maximum values indicate responses range from "not at all concerned" to "extremely concerned" for all categories. According to the median, the respondents are somewhat concerned about the extra cost of recycled water project but they very concerned about the health-related risks, source and treatment processes, and competency in local management. Appendix F provides the original SPSS output for this analysis.

Table 4. Summary of descriptive statistics on concerns about recycled water

	N	Minimum	Maximum	Median
HEALTH-RELATED RISK	1,040	0	4	3
o *Virus, bacteria, or germs in water*				
o *Pesticides or toxic material in water*				
o *Long-term unknown health effects*				
o *Effects on certain people (children, pregnant women, elderly)*				
SOURCE AND TREATMENT PROCESSES	1,045	0	4	3
o *Where the water came from*				
o *The reliability of the water treatment process*				
COMPETENCY IN LOCAL MANAGMEENT	1,040	0	4	2
o *The people in charge knowing what they are doing*				
EXTRA COST	1,044	0	4	3
o *Whether it could cost extra money*				
N = total number of valid observations				

Health-Related Risks

Aggregate responses from four survey questions (i.e., contents listed in Table 1) are used as the basis to measure concerns with health-related risks of recycled water ($\alpha = 0.915$). Table 5 illustrates the breakdown by percentage of the level of concern for health-related risks of using recycled water based on the averaged scores from these four questions. The top two levels of concerns are "seriously concerned" and "extremely concerned." Their combined percentage is 74.6% compared to 16.2% are somewhat concerned.

Table 5. Frequency table for health-related risks of using recycled water

Level of Concern		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	33	3	3	3
	SLIGHTLY	63	6	6	9
	SOMEWHAT	168	16	16	25
	SERIOUSLY	281	26	27	52
	EXTREMELY	495	47	48	100
	Total	1,040	99	100	
Missing	System	12	1		
Total		1,052	100		

Correlation with Demographics. In general, the correlation between health-related risks and demographic factors are statistically significant (p value <0 .05). The coefficient (β) in Table 5 indicates the relative influence of the independent variable. When the independent variable increases, the average amount the dependent variable increases by one unit while other independent variables are remain constant. The coding for gender is 1 for male and 2 for female. Thus the positive coefficient for gender in Table 5 suggests that females are more likely to express concern regarding health risks than males. Residing with children under the age of 18[12] also has a positive coefficient, which indicates that respondents who live with children are more likely to express concern for health risks than those who do not. The negative coefficient for age denotes that respondents younger in age are more likely concern about health risks. As for education,

[12] Coding scheme: 1=Yes; 2=Sometimes; 3=No

respondents with fewer years of education are more likely to be concerned about health-related risks.

In summary, all demographics are statistically correlated with health-related risks of recycled water based on a 95% level of significance (as indicated in Table 5). However the *R* square[13] from the model summary of the regression analysis on health-related risks, as provided in Table 6, indicates that only 6% of this variation is explained by these demographic factors. The *R* square identifies the portion of the variance accounted for by the independent variables. In the case of health-related risks, an *R* square value of 0.056 thus the percentage of variance computes to 6%. The large sample size in this research may explain the low *R* square value; the chances of identifying statistical relationship between variables are higher because it offers more statistical power (Norusis, 2005). In real-world applications, the results here are not practically significant due to low percentage of variance. The original SPSS output for health-related risks is in Appendix G.

[13] The *R-square* value is an indicator of how well the model fits the data. *R* square value ranges from 0 to 1. If there is no relationship between the independent and dependent variables, *R* square value is 0 (Norusis, 2005).

Table 6. Concerns about the health-related risks of recycled water as a function of demographics

	Coefficients(a)			
	Unstandardized Coefficients		t	Sig. (p value)
	β	Std. Error		
(Constant)	3.991	0.203	19.680	0.000
GENDER	0.158	0.066	2.405	0.016*
AGE	-0.089	0.020	-4.406	0.000*
LIVE WITH CHILDREN UNDER 18?	0.099	0.036	-2.783	0.005*
YEARS OF SCHOOL COMPLETED	-0.046	0.011	-4.072	0.000*

* Statistically significant at 5% level of significance

β = coefficient for the regression that measures the predicted values.

Table 7. Model summary from linear regression on health-related risks

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.236	0.056	0.052	1.046

a. Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?

Recycled Water Source and Treatment Processes

The survey questions used to measure people's perceptions of recycled water source and treatment processes are Survey Questions 19 and 22 (α = 0.743). In this category of concern, the results suggest that respondents are somewhat concerned with the recycled water source and treatment processes (median = 3). Table 7 shows the responses on the level of concern from the averaged scores of the two survey questions. A total of 67% of the respondents are very concerned about the source and treatment processes of recycled water. This percentage was calculated by summing the percentages from the "seriously concerned" and "extremely concerned" response choices. Results also indicate 21% of respondents are "somewhat concerned" about the source and treatment processes of recycled water.

Table 8. Frequency table for recycled water source and treatment process

Level of Concerns		*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	NOT AT ALL	42	4	4	4
	SLIGHTLY	78	8	8	12
	SOMEWHAT	221	21	21	33
	SERIOUSLY	300	29	29	61
	EXTREMELY	404	38	39	100
	Total	1,045	99	100	
Missing	System	7	0		
Total		1,052	100		

Correlation with demographics. Age and education have a statistically significant correlation with concern about the recycled water source and treatment processes (as indicated in Table 8). The results show that respondents who are younger in age and have completed fewer years of education are more likely to be concerned about the recycled water source and treatment processes. These correlations overlap with findings from the health-related risks category.

The original SPSS output for source and treatment process is in Appendix G.

Table 9. Concerns about recycled water source and treatment as a function of demographics

	Coefficients(a)			
	Unstandardized Coefficients		t	Sig. (p value)
	β	Std. Error		
(Constant)	3.716	.215	17.289	.000
GENDER	.013	.069	.191	.849
AGE	-.079	.021	-3.696	.000*
LIVE WITH CHILDREN UNDER 18?	-.060	.038	-1.594	.111
YEARS OF SCHOOL COMPLETED	-.034	.012	-2.807	.005*

a. Dependent Variable: SOURCE_TREATMENT
* Significant at 5% level of significance

Table 10. Model summary from multiple regression analysis for recycled water source and treatment

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.166	0.027	0.024	1.104

a. Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?

Trust in Local Management of Public Utility

Responses from survey question 19 (whether the people in charge know what they are doing) constructed the basis for analyzing trust in the local management of public utilities. As indicated in Table 10, 68% of respondents are seriously and extremely concerned about the competency of local management in public utilities.

Table 11. Frequency table for competency in local management in public utilities

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	NOT AT ALL	59	6	6	6
	SLIGHTLY	76	7	7	13
	SOMEWHAT	201	19	19	32
	SERIOUSLY	236	22	23	55
	EXTREMELY	472	44	45	100
	Total	1,044	99	100	
Missing	9	8	1		
Total		1,052	100		

Correlation with demographics. Age is the only variable that is statistically significant with concerns about competency of local management in public utilities. As seen in Table 11, the negative coefficient for age denotes that younger respondents are more likely to be concerned about the competency of recycled water management. However, the very low R square value (1%) suggests that the demographic variables alone explain little about variance of respondents in concerning their local management of public utilities.

The original SPSS output for concerns in competency in local management is in Appendix G.

Table 12. Concerns about competency in local management of public utilities as a function of demographics

Coefficients(a)				
	Unstandardized Coefficients		t	Sig.
	β	Std. Error		(p value)
(Constant)	3.335	.232	14.356	0.000
GENDER	.031	.075	.415	.678
AGE	-.054	.023	-2.367	.018*
LIVE WITH CHILDREN UNDER 18?	-.037	.041	-.911	.363
YEARS OF SCHOOL COMPLETED	-.015	.013	-1.143	.253

a. Dependent Variable: CONCERNED WITH RW MANAGERS KNOWING ENOUGH
* Significant at 5% level of significance

Table 13. Model summary for trust in local management of public utility

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.095	.009	.005	1.196

a. Predictors: (Constant), YEARS OF SCHOOL COMPLETED, GENDER, AGE, LIVE WITH CHILDREN UNDER 18?

Cost of Recycled Water

The analysis to examine if respondents are concerned about the cost of recycled water is based on responses from Survey Question 28[14]. Responses to this question had a median value of 2 (in Table 3), which is the lowest median value of all the aspects of concern. The low median may suggest that the public is least concerned about extra cost of recycled water when compared to health-related risks, source and treatment processes, and trust in local management. As shown in Table 13, a total of 49.8% respondents indicated they are seriously and

[14] "How concerned would you be about whether recycled water could cost extra money?"

extremely concerned about the extra cost of recycled water. A significant percentage (28.7%) of respondents indicated they are somewhat concerned about the extra cost.

Table 14. Frequency table for cost of recycled water

Level of Concerns		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	121	11	12	12
	SLIGHTLY	106	10	10	22
	SOMEWHAT	295	28	28	50
	SERIOUSLY	236	22	23	73
	EXTREMELY	282	27	27	100
	Total	1,040	99	100	
Missing	System	12	1		
Total		1,052	100		

Correlation with demographics. Level of education is the only variable that is statistically correlated with concerns about the extra cost of recycled water. The results do not indicate a significant relationship between concerns of the extra cost of recycled water with gender, age, and residing with children under 18. The negative coefficient suggests that respondents with fewer years of school completed are more likely to be concerned with the extra cost of recycled water. Despite of the statistically significance, the *R* square value suggests the demographic factors only explain 1% of this variation. The low *R* square value suggests that other factors, besides level of education, may further explain the correlation with concerns for extra cost. The original SPSS output for cost of recycled water is in Appendix G.

Table 15. Differences in the levels of concern about extra cost of recycled water as a function of demographics

Coefficients(a)				
	Unstandardized Coefficients		t	Sig.
	β	Std. Error		
(Constant)	3.129	.251	12.461	0.000
GENDER	.003	.081	.035	.972
AGE	-.036	.025	-1.454	.146
LIVE WITH CHILDREN UNDER 18?	.027	.044	.623	.533
YEARS OF SCHOOL COMPLETED	-.047	.014	-3.304	.001*

a. Dependent Variable: CONCERNED WITH EXTRA COST OF RECYCLED WATER
* Significant at 5% level of significance

Table 16. Model summary from linear regression for concerns with extra cost of recycled water

R	R Square	Adjusted R Square	Std. Error of the Estimate
.116	.013	.009	1.291

a. Predictors: (Constant), YEARS OF SCHOOL COMPLETED, GENDER, AGE, LIVE WITH CHILDREN UNDER 18?

Information that the General Public Wants to Learn More About

Of the 1,052 surveys returned, 359 surveys did not provide additional information on last survey question[15]; however, 693 respondents (66%) provided written comments on what they wanted to learn more about concerning recycled water uses for growing food crops. This percentage indicates a majority of the survey respondents lack knowledge on at least one aspect of recycled water and

[15] What might you want to know more about recycled water in order to feel more comfortable with its use in growing foods you eat?

desire additional information to make them feel comfortable using it to grow food crops.

The coding of the written comments resulted in nine categories and Table 16 presents the percentage breakdown for each category in order. As expected, respondents were most interested in knowing more about the health and food safety of using recycled water (41%). The second aspect of concerns is information on source and treatment process of recycled water (22%). The third aspect of concerns the public wants to know more about is general knowledge of recycled water (8.5%). This percentage is significantly lower than the first two categories; however, this percentage also implies that a significant portion of respondents know little about recycled water and any information would be helpful for them to understand and to perhaps change their perspective on, recycled water uses. A low number of respondents (2%) wanted information regarding the management of recycled water.

In previous discussions, 68% of respondents question the competency of recycled water management. Yet when asked about what they want to know about recycled water, desire to know about management was comparatively low. However, a high degree of interest in health-related aspects is consistent for both parts of this research. Here is one example of a written comment concerning health and food safety: "why can't we drink it? [and] yet it is ok for our crop's roots to absorb. We eat the crop, what about the plant absorption process that eliminates bacteria and viruses? [would there be] any problems?"

The results, as shown in Table 16, suggest that people would feel more comfortable about using recycled water if they possess knowledge on 1) health and food safety, 2) source and treatment processes, and 3) general knowledge of recycled water (SPSS output in Appendix H).

Table 17. Summary of cases from qualitative analysis

		N	*Valid Percentage*
"What might you want to know about recycled water in order to feel more comfortable with its use in growing food you eat?"	1. Health and Food Safety	331	40
	2. Source and Treatment Process	147	21
	3. General Knowledge	59	9
	4. Miscellaneous	57	8
	5. Purity	55	8
	6. Scientific Findings and Reports	39	4
	7. Recycled Water Applications	25	3
	8. None	18	3
	9. Management	13	2
Valid		693	66
Missing		359	34
N = total number of valid observations			
Total		1,052	

Correlation with demographics. Table 17 presents the results from the multinomial regression analysis (original SPSS output in Appendix I). The results identify correlations between categories of concern with demographic variables using the "none" category as a baseline (reference) category[16]. As noted in the *p* value column, only "scientific findings and reports" is statistically associated with age. No other variables indicated a statistically significant correlation based on a 95% confidence interval. Thus, the estimated odds for older respondents to inquire about scientific findings and reports are higher than younger respondents, compared to indicating "none."

[16] This means the rest of the variable remains in the Table 19 are compared to the miscellaneous category. The procedure in SPSS Multinomial Logistic Regression sets the coefficient of the baseline category to 0.

Table 18. Parameter estimates for information to feel comfortable with recycled water (a)

		β	Std. Error	df	Sig. (*p* value)	Exp(B)
1.Health and Food Safety	Intercept	1.830	1.547	1	.237	
	Sex	-.112	.517	1	.829	.894
	Age	.164	.178	1	.357	1.179
	Residence with kids	-.079	.283	1	.780	.924
	Education	.068	.091	1	.455	1.070
2.Source and Treatment Process	Intercept	-.913	1.626	1	.574	
	Sex	.434	.531	1	.414	1.544
	Age	.089	.183	1	.626	1.093
	Residence with kids	.142	.292	1	.628	1.152
	Education	.132	.095	1	.166	1.141
3.General Knowledge	Intercept	.624	1.701	1	.714	
	Sex	-.176	.569	1	.757	.838
	Age	.231	.193	1	.230	1.260
	Residence with kids	-.183	.310	1	.556	.833
	Education	.052	.099	1	.601	1.053
4.Miscellaneous	Intercept	-.021	1.743	1	.990	
	Sex	-.212	.576	1	.713	.809
	Age	.317	.195	1	.104	1.373
	Residence with kids	-.485	.312	1	.121	.616
	Education	.120	.101	1	.235	1.128
5.Purity	Intercept	-.074	1.743	1	.966	
	Sex	.244	.574	1	.670	1.277
	Age	.105	.197	1	.595	1.110
	Residence with kids	-.178	.312	1	.569	.837
	Education	.074	.102	1	.471	1.076
6.Scientific Findings and Reports	Intercept	-3.675	1.910	1	.054	
	Sex	.540	.606	1	.373	1.716
	Age	.448	.199	1	.024*	1.565
	Residence with kids	.053	.334	1	.875	1.054
	Education	.161	.108	1	.137	1.175
7.Recycled Water Applications	Intercept	-.237	1.969	1	.904	
	Sex	-.175	.649	1	.787	.839
	Age	.129	.219	1	.555	1.138
	Residence with kids	-.099	.352	1	.778	.906
	Education	.058	.115	1	.616	1.059
8.Management	Intercept	-4.152	2.466	1	.092	
	Sex	.528	.765	1	.490	1.696
	Age	.409	.239	1	.087	1.506
	Residence with kids	.044	.422	1	.917	1.045
	Education	.131	.138	1	.340	1.140

(a) reference category: None

*Statistically significant at 5% level of significance; Exp (B) = odds ratio

Levels of Support for Recycled Water

The applications of recycled water consist of three general settings: 1) public, 2) industrial, and 3) personal. Table 18 presents the descriptive statistics for each setting (also in Appendix J). Public use has a median value of 4 (strongly support), which is highest amongst other uses of recycled water. The median value for personal uses of recycled water indicate the mid-point in the ranked distribution of for personal use falls in the "not sure" category of choices. Compared to public and industrial applications, the data for personal uses has a wide dispersion, as indicated by the high value of standard deviation ($\sigma = 1.320$).

Table 19. What is the level of support for various applications of recycled water?

	N	Minimum	Maximum	Median
PUBLIC USES*	1,031	0	4	4
o Water public parks, lawns, and gardens				
o Public fountains, exhibits, displays				
o Public toilets, for flushing				
INDUSTRIAL USES*	1,045	0	4	3
o Industrial, manufacturing purpose				
PERSONAL USES*	1,043	0	4	2
o Washing clothes, Laundromats				

N = total number of valid observations
*Coding Scheme:
0 = Strongly oppose; 1 = Oppose; 2 = Not sure; 3 = Support; 4 = Strongly support.

Public Uses

Public use of recycled water has the highest level of support when compare to industrial and personal uses. As indicated in Table 19, a total of 83%

respondents show support such use, and only 3% opposed. With high level of support, the result suggests that respondents feel comfortable supporting recycled water in public setting.

Table 20. Frequency table for public uses

	Level of Support	*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	STRONGLY OPPOSE	9	1	1	1
	MOSTLY OPPOSE	18	2	2	3
	NOT SURE	144	14	14	17
	MOSTLY SUPPORT	329	31	32	49
	STRONGLY SUPPORT	531	51	52	100
	Total	1,031	98	100	
Missing	System	21	2		
Total		1,052	100		

Industrial Uses

Industrial use of recycled water ranked second for its level of support. According to the result, in Table 20, a total of 69% of respondents are supportive of industrial uses, and only 5% opposed to such use.

Table 21. Frequency table for industrial uses

	Level of Support	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	STRONGLY OPPOSE	16	2	2	2
	MOSTLY OPPOSE	36	3	4	5
	NOT SURE	270	26	26	31
	MOSTLY SUPPORT	218	21	21	52
	STRONGLY SUPPORT	503	48	48	100
	Total	1,043	99	100	
Missing	System	9	1		
Total		1,052	100		

Personal Uses

The respondents did not show a high level of support for personal use of recycled water. In comparison with public and industrial uses, personal use received the strongest opposition (29% opposed) and lowest approval rate (39% supported). Such a finding is as expected. Results from other parts of this research indicated that the public is most concerned about health-related risks of using recycled water. They also indicate that providing more information on the health and food safety of recycled water would the public feel more comfortable about its use for growing crops. The measure for personal use of recycled water is based on responses to the question of level of support on washing clothes in Laundromats, which implies, any negative impact from such use will directly affect individuals' health and well-being.

Table 22. Frequency table for personal use

	Level of Support	*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	STRONGLY OPPOSE	163	16	16	16
	MOSTLY OPPOSE	135	13	13	29
	NOT SURE	338	32	32	61
	MOSTLY SUPPORT	193	18	19	79
	STRONGLY SUPPORT	216	21	21	100
	Total	1,045	99	100	
Missing	System	7	1		
Total		1,052	100		

<u>Hypotheses Testing and Discussion</u>

H_1: The support for recycled water for uses in industrial and public setting will be higher than the support for personal use.

Findings and the discussions from the previous section, level of support for various uses of recycled water, support this hypothesis. The approval rate for public and industrial uses is 84% and 69%, respectively. Comparatively the approval rate for personal use is significantly lower, at 39%.

H_2: Respondents with a higher level of education will be more likely to support all uses of recycled water.

The level of education, as shown in Table 23, is statistically correlated with level of support for all uses of recycled water. The results indicate a respondent with higher level of education is more likely to support recycled water uses in general. Thus, this hypothesis is supported; however only 1% of the variance in supporting all uses of recycled water is accounted for by the selected demographic variables (Table 23). The original SPSS output for hypothesis testing is attached in Appendix K.

Table 23. Level of support for all uses and correlation with demographic variables

Coefficients(a)				
	Unstandardized Coefficients		t	Sig.
	β	Std. Error		(p value)
(Constant)	2.651	.149	17.812	.000
GENDER	-.072	.047	-1.527	.127
AGE	.031	.015	2.146	.032*
LIVE WITH CHILDREN UNDER 18	.031	.026	1.196	.232
YEARS OF SCHOOL COMPLETED	.041	.008	4.840	.000*

(a) Dependent Variable: GENERAL SUPPORT
* Significant at 5% level of confidence

Table 24. Model summary for level of support for all uses and demographic variables

R	R Square	Adjusted R Square	Std. Error of the Estimate
.116	.013	.009	1.291

a. Predictors: (Constant), YEARS OF SCHOOL COMPLETED, GENDER, AGE, LIVE WITH CHILDREN UNDER 18?
b. Dependent Variable: General Support

H_3: The younger the age of respondents, the more likely they will support all uses of recycled water.

Age is significantly correlated with all uses of recycled water. However, the results from multiple regression analysis suggest that the older the respondents, the more likely they will support recycled water uses in general. Thus, this hypothesis is not supported.

H_4: Females will be less likely to support all uses of recycled water.

The negative regression coefficient for gender (β = -0.72) suggests that males in this sample were more likely to support all uses of recycled water. However, the result is not statistically significant. This hypothesis is not supported by the sample of this study. In fact, gender was only found to be statistically correlated with health-related risks, which females are more likely to be concerned about health risks of recycled water.

DISCUSSION

In this section, first the findings from the study are discussed relative to the research hypotheses in terms of how each finding converges or diverges from prior research, whether the finding appears to be a new contribution and offers possible explanations for the findings. Second, is a discussion of the implications of the findings. Third, is a discussion of the limitations of the research. Fourth, is a discussion of recommendations for practice and suggestions for future study. Finally, are concluding remarks.

Findings Summary

This study began with the observation that water reuse projects are often rejected by the public and that research indicates that public perception of water reuse tends to be the major obstacle. Recent research studies have examined the proposition that public perception may be related to certain demographic characteristics. In order to advance our understanding of the potential relationship between public perception of water reuse and demographic variables this research proposed four research hypothesis for testing. In the previous section, the results of analysis were presented and in this section, the discussion turns to integrating the findings related to issues of public concern to the hypotheses. Table 25 presents an aggregated view of all the study findings, and the following section relates these findings with their respective hypothesis.

Table 25. Summary of all Findings

Aspects of Concern *	*Percentage of Concern*	*Demographic Correlation*
Health-related Risk	75%	Respondent who is a female, lives with kids, younger in age, or has fewer years of education is likely to be concerned about health-related risk of recycled water
Source and Treatment Processes	67%	Respondent who is younger in age, or has fewer years of education is likely to be concerned about source and treatment processes of recycled water.
Competency in Local Management	68%	Respondent who is younger in age is likely to be concerned about competency in management of local water utilities.
Extra Cost	50%	Respondents who completed fewer years of school is likely to be concerned about the extra cost of recycled water.
Topics of recycled water the public wants to know (top 3 ranks only)		
1. Health and Food Safety	40%	Not statistically significant
2. Source and Treatment Process	21%	Not statistically significant
3. General Knowledge	9%	Not statistically significant
Recycled Water Uses	***Percentage of Support****	
Public Uses	83%	Not applicable
Industrial Uses	69%	Not applicable
Personal Uses	39%	Not applicable

* Percentage is based on responses from "seriously" and "extremely" concerned categories.

** Percentage is based on responses from "support" and "strongly support" categories.

Finding One – Perception of Health-related Risks

The finding that the public is concerned with perceived health risks associated with recycled water coincides with previous studies. In the Jeffrey and Jefferson study (2003), the majority of respondents did not object to recycled water use as long as measures were taken to ensure health safety. Two Australian studies (Po et al., 2003; Higgins, 2002) found that public health issues were the top concerns. In general, the public perceived recycled water as unnatural because it originates from municipal wastewater. Though its quality varies depending on the local contributors to the wastewater treatment plant, raw wastewater may contain concentrations of pathogenic bacteria, parasites, and enteric viruses (U.S. EPA, 2004). Exposures to pathogenic organisms may directly affect one's health and this may explain why the respondents in this study are very concerned about health-related risks of using recycled water.

Finding Two – Profile of Persons Most Concerned with Health Risk

In studying the results, I created a demographic profile of the study respondent who is most likely to be concerned about health-related risks associated with recycled water. The profile of that respondent is one who is a female, lives with kids, younger in age, or has fewer years of education. One interpretation is that younger respondents potentially have longer years to live compare to older respondents; it is natural for them to be more cautious about health. Another possible explanation may be that the respondents received extra years of education have a higher chance of exposure to environmental topics such as water reuse. As the Bahrain study (Al-Khalifa, 1992) showed, perception was correlated with age (and education level). Other studies (Hamilton and Greenfield, 1991; Hartley, 2003) however have shown that while there is a correlation between age and perception of water reuse, it was older persons who showed concern.

Finding Three – Profile of Persons most Concerned with Treatment Processes

Relative to source and treatment processes, I profiled the study respondent who would be most concerned and that respondent is one who is younger in age, or has fewer years of education. The low percentage of respondents who reported concern about source and treatment processes may suggest that the survey respondents were not familiar with the source and treatment processes of recycled water and did not have enough information to decide between the given choices. The relationship between water treatment and processes and heath-related risks may explain the relationship between concern about health-risk and concern about treatment processes. People are simply concerned that water treatment and processes may have a direct impact on public health as was demonstrated in the Po et al. study (2003).

The positive correlation for education may suggest that respondents with higher level of education may have a higher chance of exposure to environmental topics (e.g., water reuse) compare to respondents with fewer years of education. Respondents who are more educated may have some understanding of recycled water source and treatment processes, their understanding may help alleviate concerns, thus they are less likely to indicate concerns. Although there are statistically significant relationship between age and education, the *R* square value (in Table 9) suggests that only 3% of this variation is explained by these demographic variables. The results here again, are not practically significant. Further research is recommended to further examine the correlation between other demographic variables and concerns about recycled water source and treatment processes. Suggestions include type of occupations and prior knowledge on recycled water treatment.

Finding Four – Profile of Person most Concerned with Management Competency

Relative to competency of water management, I profiled the study responded who was the most concerned about competency in management of local water utilities and that respondent is one who is younger in age. Although a number of studies examined water management competency in terms of the connection between perceived competence and acceptance of water reuse (Frewer et al., 1996; Hurlimann and Mckay, 2004; Johnson and Scicchitano, 2000), none specifically correlated these findings with age groups. The present study might have made a new contribution with this age correlation with perception of management competency. However, further research is recommended to explore whether previous unpleasant experience with water treatment management has an effect on people's concerns about competency in their local or current government.

Finding Five – Topics of Most Interest to Public

Related to what topics were of interest to participants who responded to this question, the top ranked response was health risks. The result here is consistent with findings that relate to Research Question 1 (how does the public feel about various aspects of recycled water). This result is expected as previous water reuse studies concluded that health and safety is the public's areas of concern with respect to perceptions and acceptance. For example in the Georgantzis and Tsagarakis study (2003), when respondents were asked what they wanted to know about recycled water pertaining to growing food crops, their primary concern was information on how recycled water may affect their health in a long-term, as well as the effect on plant growth when irrigated with recycled water.

Finding Six – Health Risk Outweighs Cost Concerns

Results from this research study revealed that the public is more concerned about health-related risks than costs of recycled water, and only half of respondents said they were "very concerned" about cost. The present study results differ from other studies reviewed. For example, the Bruvold study (1988) identified costs as one of the factors of concern to the public. In the Australian study (Po et al., 2003) cost, again, was a significant determinant for public acceptance. One explanation for these findings is that the findings may be after some period of time when other issues such as health risk and knowledge of water reuse had been addressed. Another explanation for the present study result is that the public knows very little about the cost of recycled water projects because this type of information is not usually publicized. If people are focused on a primary concern, for example the perceived health risks, cost may not yet have entered their minds.

Findings Related to the Hypotheses

The results of the present study were mixed; hypotheses one and two were confirmed, however, hypotheses three and four were disconfirmed.

H_1: Support for recycled water uses in industrial and public applications will be higher than support for personal use.

Hypothesis one—that support for industrial and public applications would be higher than for personal use—was confirmed through statistical analysis. This expected finding concurs with results from several other water reuse studies conducted over the past three decades within and outside of California (Al-Khalifa et al., 1992; Bruvold and Ward, 1972; Olson and Pratte, 1978). In general, the closer the contact the less people are accepting of recycled water use. This means, both in terms of the origin of the water (from their home versus someone else's) and, in terms of how close the person's use of the recycled water would be.

H_2: Respondents with a higher level of education will be more likely to support the use of recycled water.

Hypothesis two—that respondents with higher education levels will be more likely to support recycled water—was confirmed in the analysis. This result is consistent with other findings in this research. Respondents with higher level of education are less concerned about health-related risks and source and treatment processes. Therefore, they are more likely to support uses of recycled water. This same result was found in the Georgantus and Tsagarakis (2003) study, as well as in the Al-Khalifa et al. study (1992). Conversely, the UK study by Jeffrey and Jefferson (2003), found that age was not correlated with education level or knowledge of recycled water, however, the respondents were asked to comment of the use of "greywater" from their (own) homes.

H_3: The younger the age of the respondents, the more likely they will be to support uses of recycled water in general.

Hypothesis three—that younger respondents will be more likely to support uses of recycled water in general—was disconfirmed in the statistical analysis. This finding is inconsistent with other studies on public perceptions on water reuse. A study from Jeffrey and Jefferson (2003) did not find any correlation between age and attitude towards recycled water. In another study, McKay and Hurlimann (2003) predicted and found that older age group would be more likely to oppose to water reuse. Current data on correlation between age and perceptions may seem inconclusive; however, the finding from the present research does contribute information for future studies.

H_4: Females will be less likely to support the use of recycled water in general.

Hypothesis four—that female respondents will be less likely to support recycled water use—was disconfirmed through the statistical analysis. As previous studies on water reuse have inconsistent conclusions on correlations between gender and perceptions, the result from the present research supports previous findings. For example, Hamilton and Greenfield (1991) found educated males were more likely to accept water reuse, and Hartley (2003) found that (older) women were less likely to accept water reuse. Further research is required to examine further support of recycled water uses with other variables. Some of these variations could be due to the type of question posed; namely, whether the use is agricultural or personal. It also could be due to other demographic variables, such as age and education level, or age and knowledge of water reuse.

IMPLICATIONS AND RECOMMENDATIONS

The correlations between demographic factors and perceptions of water reuse have not been studied extensively. Thus, results from this research contribute to the existing data of findings and may require further research to support the correlations. The discussion in previous chapters suggests that the public is most concerned about health-related risks and wants to understand the potential health impacts associated with recycled water, particularly uses involve direct human consumption.

Additional area of research to investigate correlations beyond demographic variables used in this research is highly recommended. Below, I offer general recommendations for public utilities to address concerns about recycled water.

Recommendation 1: Conduct further research on the beliefs, values and concerns

In this research, demographic variables have statistically significant correlations with aspects of concern in some cases; however, they are not practically significant because of the low R square values. The demographic correlation offers little real-world implication. Future studies may consider other concerns, such as beliefs, values, and previous experience or knowledge with recycled water to understand better the correlations. As Bruvold (1985) suggested, "support for potable reuse is more likely to arise from beliefs that the water supply is polluted, there is water shortage, the technology is effective, health risks are not substantial, there are economic benefits and public opinion favors it". Studies from San Diego and Orange County confirm that belief in the effectiveness and safety of the technology correlates with stronger support for potable reuse (Orange County, 1997; San Diego, 1993). Further research is recommended to explore whether previous, unpleasant experience with wastewater treatment management has an effect on the public's concerns about competency in local government.

Recommendation 2: Focus message on major aspects of concern

Results from this research revealed that the public is more concerned about health-related risks than costs of recycled water, and only half of respondents said they were "very concerned" about cost. Water and public utilities in the Santa Clara County should focus their message on following aspects during outreach efforts:

- Cite credible medical and health experts and present results from long-term studies of recycled water could safeguard the public health-related risks
- Identify existing uses of recycled water, particularly for food crop irrigation, and ensure the public of its safe uses and compliance to the water quality standards
- Use layperson's language, clearly explain where recycled water comes from and provide details on how it is treated. Illustrations are always helpful in explaining the technical steps involved in each treatment process
- Provide brief introduction on the agency or organization, and explain its mission and responsibilities involving recycled water projects. This could increase the public's concerns about competency in local management.

CONCLUSION

As water and public utility agencies strive to expand their recycled water developments, winning public's acceptance is one of the key ingredients for projects to move forward as planned. In this research, demographic factors explained little variation about the public's concerns on recycled water. Findings of this research show that respondents expressed that they were most concerned with health-related risks, followed by treatment processes, competency in local management, and extra costs. Understanding the public's concerns about recycled water uses and their demographic correlations can help water agencies to reach their audience more effectively. Further research is necessary to further explain influential factors of public perceptions.

Understanding how the public perceives recycled water is a critical first step in determining whether a recycled water project will be implemented successfully. Public participation in project planning and enhancing public education are critical elements that may improve the public's perception and acceptance of recycled water. When information is available, the public can make educated choices regarding recycled water uses.

To minimize the gap between water and utility agencies and the public, existing efforts on recycled water outreach should be expanded further. Expansion of recycled water uses in the future requires a true effort in engaging the public in project planning stage, understanding the community's concerns, and developing effective outreach materials on recycled water to address those concerns.

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APPENDIX A. RECYCLED WATER TREATMENT PROCESS

According to the Recycled Water Task Force, recycled water undergoes Primary, Secondary, and Tertiary treatments depending on types of end use (DWR, 2003). Below is description of each treatment as defined by the Recycled Water Task Force.

Primary Treatment— Primary treatment plants generally remove 25 to 35 percent of the Biological Oxygen Demand (BOD) and 45 to 65 percent of the total suspended matter. The water from which solids have been removed is then subjected to Secondary Wastewater Treatment and possibly Tertiary Wastewater Treatment.

Secondary Treatment— Treatment (following Primary Wastewater Treatment) involving the biological process of reducing suspended, colloidal, and dissolved organic matter in effluent from primary treatment systems and which generally removes 80 to 95 percent of the Biochemical Oxygen Demand (BOD) and suspended matter. Secondary wastewater treatment may be accomplished by biological or chemical-physical methods. Activated sludge and trickling filters are two of the most common means of secondary treatment. It is accomplished by bringing together waste, bacteria, and oxygen in trickling filters or in the activated sludge process. Disinfection is usually the final stage of secondary treatment.

Tertiary Treatment— Biological, physical, and chemical treatment processes that follow Secondary Wastewater Treatment. The most common Tertiary Wastewater Treatment process consists of flocculation basins, clarifiers, filters, and disinfection processes. The term Tertiary (Wastewater) Treatment is also used to include Advanced Treatment beyond filters.

APPENDIX B. RECYCLED WATER SURVEY

GUADALUPE
RIVER PARK & GARDENS

SURVEY ON RECYCLED WATER USE IN COMMUNITY GARDENS

The first few questions are about your background. Again, we do NOT want to identify you personally or by name. Please check your answers to the questions below. Thank you.

1. Are you now (or have you ever been) involved with San José's community garden program?
   - ( ) Used to be, but no longer
   - ( ) Currently have a plot in a garden
   - ( ) On a waiting list for a garden plot
   - ( ) Never had any connection to the program

2. Sex or gender? ( ) Male ( ) Female

3. What is your age?

( ) Under 18	( ) 35-44	( ) 65-74
( ) 18-24	( ) 45-54	( ) 75-84
( ) 25-34	( ) 55-64	( ) 85 or Over

4. Do children under the age of 18 live with you?
   ( ) Yes ( ) Sometimes ( ) No

5. Please <u>circle</u> the last grade/year - or the equivalent - you completed in school.

None	1 2 3 4 5 6 7 8	9 10 11 12	13 14 15 16	17 18 19 20
	Grade School	High School	College	Graduate School

6. With which ethnic background do you identify?

( ) African American or black ( ) Latino or Hispanic
( ) Asian or Pacific Islander ( ) Euro-American or white
( ) Other: ____________________________

7. Do you regularly garden as a hobby and/or grow your own food?

( ) Yes, both ( ) Yes, grow food only
( ) Yes, garden only ( ) No, don't do either

8) How much have you heard about recycled water and its uses before?

( ) Very little or nothing
( ) Some information
( ) A great deal - or have even studied it yourself

The rest of the questions ask for your opinions about recycled water and how it might be used. Your honest opinions will help the Friends of Guadalupe River Park & Gardens to develop future gardens.

First, for questions 8-15, please circle how you feel about the use of use of recycled water (RW)? Would you support or oppose using RW for this purpose in San José?

Please use the following guidelines as you circle your answers ...

Strongly support use of RW for this purpose	**Mostly support** use of RW for this	Very **mixed** feelings or **not sure**	**Mostly oppose** use of RW for this	**Strongly oppose** use of RW for this purpose
4	3	2	1	0

	Strongly Support		Not Sure		Strongly Oppose
9) Industrial, manufacturing purposes	4	3	2	1	0
10) Watering public parks, lawns, & gardens	4	3	2	1	0
11) Public fountains, exhibits, displays	4	3	2	1	0
12) Public toilets, for flushing	4	3	2	1	0
13) To save public money	4	3	2	1	0
14) Washing clothes, laundromats	4	3	2	1	0
15) Agriculture: irrigating crops, growing produce	4	3	2	1	0
16) As an individual choice in community gardens	4	3	2	1	0

State Department of Health officials say recycled water is safe to use on lawns, yards, and food crops. If RW was used to irrigate parks, school grounds, and community gardens in San José, **how concerned would you be about each of the following?**

	Not at all Concerned		Somewhat Concerned		Extremely Concerned
17) Viruses, bacteria, or germs in the water	0	1	2	3	4
18) Pesticides or toxic material in the water	0	1	2	3	4
19) Where the water came from	0	1	2	3	4
20) Long-term unknown health effects	0	1	2	3	4
21) Effects on certain people: children, pregnant women, the elderly, for example	0	1	2	3	4
22) The reliability of the water treatment process	0	1	2	3	4
23) Enough of it being available when needed	0	1	2	3	4
24) Keeping it separate from drinking water	0	1	2	3	4
25) Children playing in it	0	1	2	3	4
26) Getting it on my own skin	0	1	2	3	4
27) Accidentally drinking it	0	1	2	3	4
28) Whether it could cost extra money	0	1	2	3	4
29) The people in charge knowing what they are doing	0	1	2	3	4
30) Ingesting toxics taken up by plants or produce	0	1	2	3	4

31) To your knowledge, is RW used to irrigate any food crops in California now?
( ) Yes ( ) Not sure ( ) No (skip to #32)
↓ ↓

32) About what percentage of all RW used in California would you guess goes to irrigate the state's commercial food crops? ____________________

33) What do you think would be the best way to inform the public about approved uses for RW? (Please check all that you would personally see, or read, or listen to.)

( ) Mailed brochures, newsletters
( ) Local newspapers
( ) Television
( ) Radio
( ) Signs or billboards
( ) Community or neighborhood meetings
( ) Other: ______________________________

____

Last question ➘

34) What might you want to know about RW in order to feel more comfortable with its use in growing foods you eat?

____

____

____

* * * * * *

For your information, 48% or almost half the RW used in California irrigates the state's commercial food crops.

We very much appreciate your help with our survey. If you have any additional comments about recycled water, especially its use in community gardens, would you share them with us below, please? Thank you.

APPENDIX C. CONSENT FORM

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Fax: 408-924-5322
E-mail: socio@email.sjsu.edu

Spring 2005

Dear Sir or Madam,

We are asking for your help in a study on opinions about recycled water being used in a new San Jose community garden. Recycled water is treated wastewater with sediments and impurities removed before reuse. For different uses, there are different levels of treatment. The water's treatment is determined by its final use and by state regulations. It cannot be used for drinking but is often used in industry and agriculture.

Your participation is voluntary. If you decide to participate in the study you are free to withdraw at any time without any negative effect on your relations with either San José's Community Gardens Program or San José State University.

While we see no risks to you in completing the survey, there is no compensation for participation, and there may be no direct benefits to you for participating in the study. However, the Friends of Guadalupe River Park & Gardens will use the information you provide to help plan its Community Garden Program and the use of recycled water.

The results of this study may be published, but any information that could result in your identification will remain confidential. Please do not put your name on the survey.

Questions about this research may be addressed to Professor David Asquith at (408) 924-5338. Complaints about the research may be presented to Professor Yoko Baba, Chair of the Department of Sociology at (408) 924-5334. Questions about research subjects' rights, or in the event of any research-related injury, please contact Pamela Stacks, Ph.D., and San Jose State's Interim Associate Vice President for Graduate Studies and Research, at (408) 924-7029. You may also contact Ms. Kathleen Muller, Executive Director of the Friends of Guadalupe River Park & Gardens, at (408) 794-1132.

Sincerely,

David Asquith, Ph.D.	Ms. Kathleen Muller
Associate Professor of Sociology	Exective Director
San José State University	Friends of Guadalupe River Park & Gardens

(For more information about recycled water, contact South Bay Water Recycling at 408-277-3671 or www.sanjoseca.gov/sbwr/ ... Thank you.)

The California State University:
Chancellor's Office
Bakersfield, Channel Islands, Chico, Dominguez Hills, Fresno, Fullerton, Hayward, Humboldt, Long Beach, Los Angeles, Maritime Academy, Monterey Bay, Northridge, Pomona, Sacramento, San Bernardino, San Diego, San Francisco, San José, San Luis Obispo, San Marcos, Sonoma, Stanislaus

APPENDIX D. CODING SCHEME FOR INDEPENDENT VARIABLES

Age

0 = "under 18"
1 = "18—24"
2 = "25—34"
3 = "35—44"
4 = "45—54"
5 = "55—64"
6 = "65—74"
7 = "75—84"
8 = "85 or over"
9 = "missing"

Gender

1 = "male"
2 = "female"

Residence with Children under 18

1 = "yes"
2 = "sometimes"
3 = "no"

Education

0 = "none"
99 = "missing"

Grade School
1 = "grade 1"
2 = "grade 2"
3 = "grade 3"
4 = "grade 4"
5 = "grade 5"
6 = "grade 6"
7 = "grade 7"
8 = "grade 8"

High School
9 = "grade 9"
10 = "grade 10"
11 = "grade 11"
12 = "grade 12"

College
13 = "grade 13"
14 = "grade 14"
15 = "grade 15"
16 = "grade 16"

Graduate School
17 = "grade 17"
18 = "grade 18"
19 = "grade 19"
20 ="grade 20"

APPENDIX E. SURVEY QUESTIONS USED IN THIS STUDY

If recycled water was used to irrigate parks, school grounds, and community gardens in San Jose, how concerned would you be about:

17. Viruses, bacteria, or germs in the water
18. Pesticides or toxic material in the water
19. Where the water came from
20. Long-term unknown health effects
21. Effects on certain people: children, pregnant women, the elderly
22. The reliability of the water treatment process
28. Whether it could cost extra money
29. The people in charge knowing what they are doing

Would you support or oppose using recycled water for this purpose in San José?

9. Industrial, manufacturing purposes
10. Washing public parks, lawns, & gardens
11. Public fountains, exhibits, displays
12. Public toilets, for flushing
13. To save public money
14. Washing clothes, Laundromats
15. Agriculture: irrigation crops, growing produce
16. As an individual choice in community gardens

APPENDIX F. SPSS OUTPUT FOR RESEARCH QUESTION 1

How concerned is the general public about the following aspects of recycled water?

Frequencies

Statistics

		Health_Related_Concern	Source_and_Treatment	CONCERNED WITH EXTRA COST OF RW	CONCERNED WITH RW MANAGERS KNOWING ENOUGH
N	Valid	1040	1045	1040	1044
	Missing	12	7	12	8
Median		3.00	3.00	2.00	3.00
Std. Deviation		1.076	1.118	1.301	1.201
Minimum		0	0	0	0
Maximum		4	4	4	4

Frequency Table

Health_Related_Concern

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	33	3.1	3.2	3.2
	SLIGHTLY	63	6.0	6.1	9.2
	SOMEWHAT	168	16.0	16.2	25.4
	SERIOUSLY	281	26.7	27.0	52.4
	EXTREMELY	495	47.1	47.6	100.0
	Total	1040	98.9	100.0	
Missing	System	12	1.1		
Total		1052	100.0		

Source_and_Treatment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	42	4.0	4.0	4.0
	SLIGHTLY	78	7.4	7.5	11.5
	SOMEWHAT	221	21.0	21.1	32.6
	SERIOUSLY	300	28.5	28.7	61.3
	EXTREMELY	404	38.4	38.7	100.0
	Total	1045	99.3	100.0	
Missing	System	7	.7		
Total		1052	100.0		

CONCERNED WITH EXTRA COST OF RW

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	121	11.5	11.6	11.6
	SLIGHTLY	106	10.1	10.2	21.8
	SOMEWHAT	295	28.0	28.4	50.2
	SERIOUSLY	236	22.4	22.7	72.9
	EXTREMELY	282	26.8	27.1	100.0
	Total	1040	98.9	100.0	
Missing	9	12	1.1		
Total		1052	100.0		

CONCERNED WITH RW MANAGERS KNOWING ENOUGH

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	59	5.6	5.7	5.7
	SLIGHTLY	76	7.2	7.3	12.9
	SOMEWHAT	201	19.1	19.3	32.2
	SERIOUSLY	236	22.4	22.6	54.8
	EXTREMELY	472	44.9	45.2	100.0
	Total	1044	99.2	100.0	
Missing	9	8	.8		
Total		1052	100.0		

APPENDIX G. SPSS OUTPUT FOR RESEARCH QUESTION 2

How do the abovementioned four aspects of recycled water correlate with age, gender, level of education, and residence with children under 18?

Regression

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?(a)	.	Enter

a All requested variables entered.
b Dependent Variable: Health_Related_Concern

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.236(a)	.056	.052	1.046

a Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	65.291	4	16.323	14.917	.000(a)
	Residual	1104.044	1009	1.094		
	Total	1169.334	1013			

a Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?

b Dependent Variable: Health_Related_Concern

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.991	.203		19.680	.000
	SEX/GENDER	.158	.066	.074	2.405	.016
	AGE	-.089	.020	-.135	-4.406	.000
	LIVE WITH CHILDREN UNDER 18?	-.099	.036	-.087	-2.783	.005
	YEARS OF SCHOOL COMPLETED	-.046	.011	-.127	-4.072	.000

a Dependent Variable: Health_Related_Concern

Regression

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?(a)	.	Enter

a All requested variables entered.
b Dependent Variable: Source_and_Treatment

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.166(a)	.027	.024	1.104

a Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.846	4	8.711	7.146	.000(a)
	Residual	1234.934	1013	1.219		
	Total	1269.780	1017			

a Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?
b Dependent Variable: Source_and_Treatment

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.716	.215		17.289	.000
	SEX/GENDER	.013	.069	.006	.191	.849
	AGE	-.079	.021	-.115	-3.696	.000
	LIVE WITH CHILDREN UNDER 18?	-.060	.038	-.050	-1.594	.111
	YEARS OF SCHOOL COMPLETED	-.034	.012	-.088	-2.807	.005

a Dependent Variable: Source_and_Treatment

Regression

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?(a)	.	Enter

a All requested variables entered.
b Dependent Variable: CONCERNED WITH EXTRA COST OF RW

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.116(a)	.013	.009	1.291

a Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.817	4	5.704	3.421	.009(a)
	Residual	1680.656	1008	1.667		
	Total	1703.473	1012			

a Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?
b Dependent Variable: CONCERNED WITH EXTRA COST OF RW

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.129	.251		12.461	.000
	SEX/GENDER	.003	.081	.001	.035	.972
	AGE	-.036	.025	-.046	-1.454	.146
	LIVE WITH CHILDREN UNDER 18?	.027	.044	.020	.623	.533
	YEARS OF SCHOOL COMPLETED	-.047	.014	-.105	-3.304	.001

a Dependent Variable: CONCERNED WITH EXTRA COST OF RW

Regression

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?(a)	.	Enter

a All requested variables entered.
b Dependent Variable: CONCERNED WITH RW MANAGERS KNOWING ENOUGH

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.095(a)	.009	.005	1.196

a Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.178	4	3.295	2.302	.057(a)
	Residual	1449.672	1013	1.431		
	Total	1462.850	1017			

a Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?
b Dependent Variable: CONCERNED WITH RW MANAGERS KNOWING ENOUGH

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.335	.232		14.356	.000
	SEX/GENDER	.031	.075	.013	.415	.678
	AGE	-.054	.023	-.074	-2.367	.018
	LIVE WITH CHILDREN UNDER 18?	-.037	.041	-.029	-.911	.363
	YEARS OF SCHOOL COMPLETED	-.015	.013	-.036	-1.143	.253

a Dependent Variable: CONCERNED WITH RW MANAGERS KNOWING ENOUGH

APPENDIX H. SPSS OUTPUT FOR RESEARCH QUESTION 3

What are the major topics of recycled water the general public wishes to know more about, especially for crop irrigations?

Frequencies

Statistics

INFO. WANTED TO FEEL COMFORTABLE WITH RW ON CROPS

N	Valid	693
	Missing	359

INFO. WANTED TO FEEL COMFORTABLE WITH RW ON CROPS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	18	1.7	2.6	2.6
	Applications	25	2.4	3.6	6.2
	General Knowledge	59	5.6	8.5	14.7
	Health and Food Safety	279	26.5	40.3	55.0
	Management	13	1.2	1.9	56.9
	Miscenlaneous	57	5.4	8.2	65.1
	Purity	55	5.2	7.9	73.0
	Scitific Findings and Reports	39	3.7	5.6	78.6
	Source and Treatment	148	14.1	21.4	100.0
	Total	693	65.9	100.0	
Missing	99	359	34.1		
Total		1052	100.0		

APPENDIX I. SPSS OUTPUT FOR RESEARCH QUESTION 4

How do the major topics recycled water correlate with age, gender, level of education, and residence with children under 18?

Nominal Regression

Case Processing Summary

		N	Marginal Percentage
INFO. WANTED TO FEEL COMFORTABLE WITH RW ON CROPS	None	16	2.4%
	Applications	24	3.6%
	General Knowledge	57	8.4%
	Health and Food Safety	275	40.7%
	Management	13	1.9%
	Miscellaneous	53	7.9%
	Purity	53	7.9%
	Scientific Findings and Reports	39	5.8%
	Source and Treatment	145	21.5%
Valid		675	100.0%
Missing		377	
Total		1052	
Subpopulation		217(a)	

a The dependent variable has only one value observed in 112 (51.6%) subpopulations.

Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	1511.561			
Final	1459.724	51.837	32	.015

Pseudo R square

Cox and Snell	.074
Nagelkerke	.076
McFadden	.022

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	1499.824	40.099	8	.000
sex	1471.804	12.080	8	.148
age	1477.035	17.310	8	.027
kids	1474.572	14.847	8	.062
educatn	1465.814	6.090	8	.637

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

Parameter Estimates

INFO. WANTED TO FEEL COMFORTABLE WITH RW ON CROPS(a)		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
Applications	Intercept	-.237	1.969	.014	1	.904			
	sex	-.175	.649	.073	1	.787	.839	.235	2.995
	age	.129	.219	.348	1	.555	1.138	.741	1.747
	Kids	-.099	.352	.079	1	.778	.906	.454	1.807
	Education	.058	.115	.252	1	.616	1.059	.846	1.327
General Knowledge	Intercept	.624	1.701	.135	1	.714			
	Sex	-.176	.569	.096	1	.757	.838	.275	2.559
	Age	.231	.193	1.441	1	.230	1.260	.864	1.838
	Kids	-.183	.310	.348	1	.556	.833	.454	1.529
	Education	.052	.099	.274	1	.601	1.053	.867	1.279
Health and Food Safety	Intercept	1.830	1.547	1.399	1	.237			
	sex	-.112	.517	.047	1	.829	.894	.325	2.463
	age	.164	.178	.848	1	.357	1.179	.831	1.672
	kids	-.079	.283	.078	1	.780	.924	.530	1.609
	Education	.068	.091	.559	1	.455	1.070	.896	1.278
Management	Intercept	-4.152	2.466	2.836	1	.092			
	sex	.528	.765	.478	1	.490	1.696	.379	7.591
	age	.409	.239	2.931	1	.087	1.506	.942	2.405
	kids	.044	.422	.011	1	.917	1.045	.457	2.388
	education	.131	.138	.911	1	.340	1.140	.871	1.493
Miscellaneous	Intercept	-.021	1.743	.000	1	.990			
	sex	-.212	.576	.135	1	.713	.809	.262	2.501
	age	.317	.195	2.639	1	.104	1.373	.937	2.012
	kids	-.485	.312	2.408	1	.121	.616	.334	1.136
	Education	.120	.101	1.409	1	.235	1.128	.925	1.376
Purity	Intercept	-.074	1.743	.002	1	.966			
	sex	.244	.574	.181	1	.670	1.277	.414	3.934
	age	.105	.197	.282	1	.595	1.110	.754	1.635
	kids	-.178	.312	.324	1	.569	.837	.454	1.543
	Education	.074	.102	.519	1	.471	1.076	.881	1.315
Scientific Findings and Reports	Intercept	-3.675	1.910	3.703	1	.054			
	sex	.540	.606	.795	1	.373	1.716	.524	5.622
	age	.448	.199	5.065	1	.024	1.565	1.060	2.311
	kids	.053	.334	.025	1	.875	1.054	.548	2.028
	Education	.161	.108	2.211	1	.137	1.175	.950	1.453
Source and Treatment Processes	Intercept	-.913	1.626	.316	1	.574			
	sex	.434	.531	.668	1	.414	1.544	.545	4.371
	age	.089	.183	.237	1	.626	1.093	.764	1.566
	kids	.142	.292	.235	1	.628	1.152	.650	2.042
	Education	.132	.095	1.916	1	.166	1.141	.947	1.375

a The reference category is: None.

APPENDIX J. SPSS OUTPUT FOR RESEARCH QUESTION 5

What is the level of support for recycled water in public, industrial, and personal use?

Frequencies

Statistics

		Public_Uses	SUPPORT RW FOR WASHING CLOTHES	SUPPORT RW FOR MANUFAC TURING
N	Valid	1031	1045	1043
	Missing	21	7	9
Median		4.00	2.00	3.00
Std. Deviation		.840	1.320	1.003
Minimum		0	0	0
Maximum		4	4	4

Frequency Table

SUPPORT RW FOR WASHING CLOTHES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	STR. OPPOSE	163	15.5	15.6	15.6
	OPPOSE	135	12.8	12.9	28.5
	NOT SURE	338	32.1	32.3	60.9
	SUPPORT	193	18.3	18.5	79.3
	STR. SUPPORT	216	20.5	20.7	100.0
	Total	1045	99.3	100.0	
Missing	9	7	.7		
Total		1052	100.0		

SUPPORT RW FOR MANUFACTURING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	STRONGLY OPPOSE	16	1.5	1.5	1.5
	OPPOSE	36	3.4	3.5	5.0
	NOT SURE	270	25.7	25.9	30.9
	SUPPORT	218	20.7	20.9	51.8
	STR. SUPPORT	503	47.8	48.2	100.0
	Total	1043	99.1	100.0	
Missing	9	9	.9		
Total		1052	100.0		

Frequencies

Statistics

		Public_Uses	SUPPORT RW FOR WASHING CLOTHES	SUPPORT RW FOR MANUFAC TURING
N	Valid	1031	1045	1043
	Missing	21	7	9

Frequency Table

Public_Uses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	9	.9	.9	.9
	SLIGHTLY	18	1.7	1.7	2.6
	SOMEWHAT	144	13.7	14.0	16.6
	SERIOUSLY	329	31.3	31.9	48.5
	EXTREMELY	531	50.5	51.5	100.0
	Total	1031	98.0	100.0	
Missing	System	21	2.0		
Total		1052	100.0		

SUPPORT RW FOR WASHING CLOTHES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	STR. OPPOSE	163	15.5	15.6	15.6
	OPPOSE	135	12.8	12.9	28.5
	NOT SURE	338	32.1	32.3	60.9
	SUPPORT	193	18.3	18.5	79.3
	STR. SUPPORT	216	20.5	20.7	100.0
	Total	1045	99.3	100.0	
Missing	9	7	.7		
Total		1052	100.0		

SUPPORT RW FOR MANUFACTURING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	STRONGLY OPPOSE	16	1.5	1.5	1.5
	OPPOSE	36	3.4	3.5	5.0
	NOT SURE	270	25.7	25.9	30.9
	SUPPORT	218	20.7	20.9	51.8
	STR. SUPPORT	503	47.8	48.2	100.0
	Total	1043	99.1	100.0	
Missing	9	9	.9		
Total		1052	100.0		

Frequencies

Statistics

Public_Uses

N	Valid	1031
	Missing	21

Public_Uses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	STR. OPPOSE	9	.9	.9	.9
	OPPOSE	18	1.7	1.7	2.6
	NOT SURE	144	13.7	14.0	16.6
	SUPPORT	329	31.3	31.9	48.5
	STR. SUPPORT	531	50.5	51.5	100.0
	Total	1031	98.0	100.0	
Missing	System	21	2.0		
Total		1052	100.0		

APPENDIX K. SPSS OUTPUT FOR HYPOTHESIS TESTING

Regression

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?(a)	.	Enter

a All requested variables entered.
b Dependent Variable: General_Support

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.190(a)	.036	.032	.741

a Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.087	4	5.022	9.146	.000(a)
	Residual	534.785	974	.549		
	Total	554.872	978			

a Predictors: (Constant), YEARS OF SCHOOL COMPLETED, SEX/GENDER, AGE, LIVE WITH CHILDREN UNDER 18?
b Dependent Variable: General_Support

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.651	.149		17.812	.000
	SEX/GENDER	-.072	.047	-.048	-1.527	.127
	AGE	.031	.015	.068	2.146	.032
	LIVE WITH CHILDREN UNDER 18?	.031	.026	.038	1.196	.232
	YEARS OF SCHOOL COMPLETED	.041	.008	.155	4.840	.000

a Dependent Variable: General_Support