Environmental Attitudes, Knowledge, and Behaviors of Residents of Charleston, Berkeley, and Dorchester Counties, S.C.

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Executive Summary

In May 2009, Carolina Clear of the Clemson University Restoration Institute contracted with researchers from Clemson University's Department of Sociology and Anthropology (Dr. Catherine Mobley and Dr. James Witte) and the School of Computing (Dr. Roy Pargas) to conduct a telephone survey of residents of Charleston, Berkeley and Dorchester counties (henceforth "the tri-county area") in South Carolina.

The population of the tri-county area is such that a sample of 385-400 respondents would permit estimates of the survey results with a margin of error of $\pm$ 5% at a 95% confidence level. The survey was conducted mid-June through mid-July 2009. Data were collected from 399 residents from the following 23 zip code areas in the tri-county area of Charleston, Berkeley and Dorchester counties:

29401	29404	29407	29418	29439	29456	29465	29484
29402	29405	29412	29420	29445	29461	29482	29485
29403	29406	29414	29423	29451	29464	29483	

The main goal of the survey was to obtain information about residents' attitudes, knowledge, behaviors, and intentions as they relate to the environment. The results can serve as a baseline for measuring the success of future environmental and stormwater education efforts. The information collected about the various subgroups (and reported in the cross-tabulation analyses of the full report) can assist staff in targeting educational efforts by sociodemographic characteristics.

Brief Description of Sample

When compared to the general population as reflected in Census 2000 data, the tri-county survey sample was disproportionately female (61.4% of the sample vs. 50.9% of the actual population in the 23 zip code areas, as reported by the U.S. Bureau of the Census) and better educated than the general population (with 51.8% of the sample earning a bachelor's degree or higher vs. 25.4% of the general population). With respect to race, 81.7% of the sample was white as compared to 68.0% of the general population. There were also some differences in the age profiles, with the survey sample comprised of a greater proportion of individuals 55 and older than found in the general population (52.6% vs. 24.2%, respectively) and a lower proportion of 18-24 year olds (4.1% of the phone survey vs. 15.5% of the general population). The proportion of respondents who indicated they were homeowners (87.8%) was greater than the proportion of homeowners reflected in the Census data (62.7%). Just over 40% of respondents indicated they lived next to a creek, stream, river, pond or other water body.

Research has shown that some of these segments of the population (e.g., higher-educated females) are more likely to participate in surveys. Thus, we adjusted for the demographic differences between the telephone sample and Census data by using standard statistical weighting procedures. The resulting weighted data are a closer approximation of Census population figures and are thus a better representation of the public's views on the issues covered in this survey. The results reported and discussed in this Executive Summary and the full report are based on the weighted data.

Main Findings

Survey results reveal a complex picture of the environmental views of tri-county residents. The summary below presents some of the main research findings.

- Residents of the tri-county area are concerned about water quality in the region and place a high value on the water bodies in their area. Nearly 32% of respondents are "very concerned" and 41.9% are "somewhat concerned" about pollution and the environmental quality of local streams and waterways.

- Residents have a basic level of understanding about the various causes of poor water quality. When asked about the impact of humans on the environment, 46.8% of indicated that what people do on the land affects the quality of their local streams and waterways "a great deal." However, 7% indicated they did not know. Nearly 65% of respondents "strongly agreed" or "agreed" that inspection and pump out of septic tanks protects water quality, although 20.8% responded "do not know" for this survey item. Approximately 67.4%"strongly agreed" or "agreed" that pet waste is a source of bacteria pollution in local waterways; 11.6% indicated they did not know if this was the case. Regarding beliefs about the treatment of stormwater, 77% of respondents did not believe that stormwater was treated before reaching lakes, rivers and streams.

  Respondents were also asked to rate the extent to which nine different activities impacted streams and lakes in the area. Respondents were most likely to say that the following sources of pollution had either a "great impact" or "some impact" on water quality: industrial sites (84.5%), fuel and oil leaks from trucks, buses or automobiles (86.5%), and fertilizers and lawn chemicals that people use on their lawn and garden (78.2%). Of the items listed, respondents were most likely to indicate that the following sources of pollution had either "very little" or "no impact" on water quality: waste from birds (59.2%), pet waste (46.3%), and run off from people washing their cars (43.8%).

- The high level of concern about water quality is generally matched by a fairly good level of knowledge among residents about the basics of watersheds. When asked to choose the correct definition of the term "watershed," 29.5% of respondents selected the correct answer ("area that drains into specific river or lake"). However, slightly more than one-fifth (21.5%) indicated they did not know the correct definition for the term "watershed." An equal proportion of respondents (14.7%) selected the following two definitions: "reservoir that serves as a municipal water source" and "small building where water is stored."

- For the most part, residents of the tri-county area are involved in water and environmental conservation efforts. Slightly more than 72% of respondents of respondents indicated that, in the past two years, they had made an effort to reduce water usage out of concern for water quantity (i.e., drought) issues. However, a smaller proportion (40.2%) revealed that, in the past two years, they had reduced water usage out of concern for water quality. In general, tri-county residents are somewhat active in citizen-based environmental efforts: slightly more than 30% of respondents indicated that they had participated in a lake or river cleanup, while slightly more than 18% indicated they have joined or volunteered for a conservation organization in the past two years.

- There are some indications that tri-county residents are engaging in environmentally-friendly household behaviors, although some residents are engaging in behaviors that could harm local rivers and streams. Nearly all of the respondents indicated that, in the past two years, they "never" disposed of oil, paint, or other chemicals down the drain (96.0%), stored fertilizers and pesticides in leaking containers (95.8%), or dumped grass clippings down storm drains or backyard creeks (93.8%). Eighty-six percent of respondents indicated they "never" operated a motor vehicle with a leak and just over one-half of respondents (53.9%) indicated they "always" considered the likelihood of a rainstorm before treating their lawn with fertilizers or pesticides. Slightly more than 82% of respondents indicated they "always" cleaned up after their pets when taking them for a walk and nearly 54% "always" considered the likelihood of a rainstorm before treating their lawn with fertilizer or pesticide. However, nearly 70% of respondents indicated that they "never" washed their car on the lawn or gravel instead of pavement.

- Tri-county residents are somewhat active in outdoor recreational behaviors, but there is a mixed picture in regard to water-based recreational activities. Visiting the beach and hiking and walking were the two most popular activities, with 35.3% and 20.4% of respondents indicating they participated in these activities "often," respectively. However, nearly 84.4% of respondents indicated they have "never" gone hunting or trapping, 83.6% indicated they had "never" kayaked or canoed, 64.0% indicated they had "never" gone swimming in rivers or lakes, and 63.9% indicated they "never" had gone motorboating. Just over one-half (51.1%) of respondents indicated they had "never" gone fishing.

- The high level of concern about water quality is generally matched by a high level of willingness to get involved with water resource issues. Slightly more than 82% of respondents indicated they would "very likely" become involved if they were directly impacted by water quality. Nearly 48% of respondents said they would "very likely" become involved in water quality improvement efforts if they knew the local government could save money. Nearly 45% of respondents indicated it was "very likely" they would become involved if the local media ran stories on positive actions taken by residents to improve water quality. Respondents were least likely to indicate they would "very likely" become involved for two items: if the local media ran stories on local water pollution problems (36.7% indicating "very likely" for this item) and if they had more information about water quality issues in their area (30.5% indicating "very likely").

- Respondents use a variety of media for receiving local and regional information and news. Respondents were asked to choose the three primary ways that they receive local and regional information and news. Slightly more than 62% of respondents indicated that they received their news through television evening news broadcasts and 60.7% indicated the television morning news was a primary source of information. Local newspapers were the third most important source of information for respondents: 44.8% of respondents indicated this as one of their three primary sources of news. Billboards and posters and events and workshops were the least frequently mentioned source of news and information: 2.4% and .8% indicated these sources as one of their three primary sources of news, respectively. In response to a separate question, slightly more than 56% of respondents indicated they used the Internet to get their local and regional news.

- There is a low level of awareness among respondents about local organizations that seek to improve water quality. Slightly more than 92% of respondents indicated they had never heard of Carolina Clear. Slightly more than 6% had heard of Carolina Clear, but were not aware of its programs, while 1.5% indicated they were aware of Carolina Clear and were familiar with its programs. Respondents were slightly more aware of the Ashley Cooper Stormwater Education Consortium: 14.7% of respondents indicated they had heard of the consortium, but were not familiar with its programs. One percent of respondents indicated they were aware of the Consortium and its programs. However, 84.3% had not heard of the Consortium.

Project Goals

In May 2009, Carolina Clear of the Clemson University Restoration Institute contracted with researchers from Clemson University's Department of Sociology and Anthropology (Dr. Catherine Mobley and Dr. James Witte) and the School of Computing (Dr. Roy Pargas) to conduct a telephone survey of residents of Charleston, Berkeley and Dorchester counties (henceforth "the tri-county area") in South Carolina.

The main goal of this project was to obtain information about stakeholders' knowledge, attitudes, and behaviors as they relate to a variety of environmental issues. Some more specific objectives were to:

- Determine the overall level of concern about water quality;
- Ascertain stakeholder knowledge of environmental concepts and issues;
- Gain an accurate understanding of individual behaviors and actions that are relevant to water quality;
- Learn more about residents' level of participation in outdoor recreational activities;
- Identify openings and barriers to participation in water quality improvement efforts; and
- Ascertain the willingness of the public to become involved in water quality issues.

The results can serve as a baseline for measuring the success of future environmental and stormwater education efforts. The information collected about the various subgroups (and reported in the cross-tabulation analyses) can assist staff in targeting educational efforts by sociodemographic characteristics. Rather than being evaluative in nature, the results serve as a baseline for measuring the success of future environmental education efforts.

Methodology

This research effort consisted of a telephone survey of residents of the tri-county area, SC. The survey instrument was developed with input from Carolina Clear staff. A copy of the final survey instrument can be found in Appendix A. Survey questions were organized into the following categories (1) environmental concern; (2) environmental knowledge about environmental concepts and practices and the causes and impacts of pollution; (3) participation in recreational activities; (4) participation in environmentally positive and negative behaviors; (5) willingness to get involved in efforts to improve water quality; and (6) familiarity with environmental organizations, such as Carolina Clear.

The survey was conducted using Computer Assisted Telephone Interviewing (CATI) methods. Approval for conducting research with human subjects was obtained through Clemson University's Institutional Review Board. All interviews were conducted from the Telephone Survey Lab, located in the Department of Sociology and Anthropology at Clemson University.

from the following 23 zip code areas in the tri-county area of Charleston, Berkeley and Dorchester counties:

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Respondents were selected using a random list of phone numbers purchased from Scientific Telephone Samples, a national vendor of telephone samples. The majority of calls were made during evening hours, weekdays between 5:00 p.m. and 9:00 p.m. Limited daytime and weekend calling was also conducted so as not to exclude potential respondents who are regularly not home during the early evening hours or during the week. On average, the interviews were fifteen minutes in length.

The telephone survey was pre-tested in early May 2009 and actual data collection occurred from mid-June to mid-July 2009. A total of 399 tri-county residents was surveyed, for a margin of error of plus or minus 5%, with a 95% confidence level.

Slightly more than 28,600 phone calls were made to complete the survey. The completed response rate for the survey was 10.0%. This response rate, which was calculated using standard methods used by the American Association of Public Opinion Researchers, is quite low for a telephone survey similar in length and content to the tri-county survey. The low response rate could be attributed to a number of factors including the timing of the survey (during summer months when fewer permanent residents are available to complete the survey). For example, 23.7% of the total number of phone calls resulted in incomplete surveys due to ineligible respondents (i.e., a person being a non-resident of the household or of the region or because no eligible person was present at the household to complete the survey) or due to incorrect or non-working phone numbers (i.e., a phone number belonging to a non-household entity, a phone line being disconnected or non-working, always busy, never answered, or always picked up by an answering machine).

Another measure of response rates is the "survey cooperation rate" which includes both partial and complete interviews in the calculation. This measure reflects the willingness of individuals to complete the survey. In some cases, however, respondents were not able to do so, despite their willingness to participate. For example, a respondent may have had to end the interview because of an interruption or because a respondent ran out of time to complete the survey. Or, in some cases, respondents would complete a part of the interview before it was determined that they were ineligible (e.g., because they were not a resident of one of the 23 zip code areas surveyed). The cooperation rate for this survey of residents of Charleston, Berkeley and Dorchester counties was 14.7%.

Data Analysis

To provide an overview of research results, frequencies were generated for the sociodemographic questions (see Appendix C) and the substantive survey questions (see Appendix D).

Pearson chi-square analyses were conducted to determine if a relationship existed between the main research variables and the main sociodemographic characteristics of sex, race, education, age, and home ownership status (i.e., renters vs. owners). A summary of the results of these crosstabulation analyses is presented in Table B-1. Appendix E through Appendix I provide cross-tabulation results for the relationships between all of the major research variables and the five main demographic variables. Note that for some tables, due to rounding, the rows and columns may not add up to exactly 100.0%.

Aside from determining if there was a relationship between the main research variables and sociodemographic characteristics, it was also important to determine whether the relationship was substantively important. Therefore, along with the chi-square results we have included a measure of association to calculate the strength of the relationship between the sociodemographic variables and dependent variables of interest. Cramer's V was used to test the strength of the relationships between nominal variables or between nominal and ordinal variables. Gamma was used to test the strength of the measure of association in those cases when both variables were ordinal.

There are a variety of standards for interpreting measures of association. In this report, a Cramer's V or gamma value of .10 or less indicates a weak relationship between variables, a value between .10 and .30 designates a moderate relationship between variables. A Cramer's V or gamma value of greater than .30 indicates a strong relationship between the variables in question. This report will highlight those relationships with measures of association of .10 or above (and where the chi-square p-value is less than .05).

It should be noted that if one or more cells of the cross-tabulation tables had an expected count less than 5, the significance calculation for Cramer's V and gamma will be invalid; in these cases, a note appears at the bottom of the table in question. To reduce the number of invalid tables, the response categories for many of the main research questions were combined (e.g., the separate categories of "strongly agree" and "agree" were combined into one category of "strongly agree/agree"). While the findings for all crosstabulation analyses are presented, whether they indicated statistically significant subgroup differences or not, the reader should exercise caution when drawing conclusions from those tables that were not statistically significant or that did not have enough expected counts in a particular category or cell.

Respondents were also able to provide an open-ended response to several survey items. This allowed respondents to provide more extensive and elaborate answers to these questions. A sampling of these responses appears in Appendix J. In most cases, the respondents' original words are provided in order to gain greater insight into how respondents conceptualize and talk about a variety of environmental issues. In some instances, respondents indicated they did not want their comments shared. Thus, not all of the open-ended responses are included in Appendix J.

Sociodemographic Characteristics of Respondents

Table C-1 provides a summary of the demographic characteristics of survey respondents. When compared to the general population of the tri-county area as reflected in Census 2000 data, the tri-county survey sample was disproportionately female (61.4% of the sample vs. 50.9% of the actual population in the 23 zip code areas surveyed, as reported by the U.S. Bureau of the Census) and better educated than the general population (with 51.8% of the sample earning a bachelor's degree or higher vs. 25.4% of the general population). With respect to race, 81.7% of the tri-county sample was white as compared to 68.0% of the general population. There were also some differences in the age profiles, with the survey comprised of a greater proportion of individuals 55 and older than found in the general population (52.6% vs. 24.2%, respectively) and a lower proportion of 18-24 year olds (4.1% of the phone survey vs. 15.5% of the general population in the 23 zip code areas). The proportion of respondents who indicated they were homeowners (63.8%) was nearly equal to the proportion of homeowners reflected in the Census data (62.7%).

Research has demonstrated that some of these segments of the population (e.g., higher-educated females) are more likely to participate in surveys. Thus, we adjusted for the demographic differences between the telephone sample and Census data by using standard statistical weighting procedures. The resulting weighted data are a closer approximation of Census population figures and are thus a better representation of the views of residents of the tri-county area on the issues covered in this survey.

The weighted data and only those results that were statistically significant at the .05 level or below are discussed in this report. The raw data (i.e., the unweighted data) are presented in Appendix D as a comparison point. It is strongly recommended that, when reporting on the survey results, the adjusted (weighted) results be used. These weighted data are a more accurate representation of the environmental views of tri-county residents in general (in the zip code areas surveyed). It is also important to report the percentages, versus just reporting the numbers, of respondents providing a particular response. Focusing on percentages allows for more useful comparisons across time (i.e., if a follow-up survey is conducted to measure any changes in environmental attitude, knowledge, and behaviors) and across space (i.e., if decision makers want to compare the responses of tri-county residents with the responses of residents from other areas of the state, or even, other regions of the country).

(Note: For the frequency tables (Appendix D), the sample size reported in the tables is the unweighted sample size to give a sense of the number of respondents, out of the total sample of 399 respondents, who actually provided a response for a particular question.)

Main Findings

The remainder of the report summarizes the findings from the survey. Findings are grouped into several categories that are important for any environmental education effort: environmental concern, environmental knowledge, awareness of environmental impacts, environmental behaviors and environmental intentions. Each section below begins with an overview of results from the telephone survey, providing information about overall frequencies for the main survey items (as reported in Appendix D) and then proceeds to a discussion of the subgroup differences for the main research variables (presented in Appendix E through Appendix I). When relevant, supporting evidence from the open-ended responses (Appendix J) is provided.

Environmental Concern

To provide some context for respondents' level of environmental concern, respondents were first asked if they lived adjacent to a local body of water: "Do you live next to a creek, stream, river, lake or pond. That is, does your property adjoin some body of water?" Slightly more than 40% of respondents indicated they lived next to a creek, stream, river, pond or other water body (Table D-1). Males were more likely than females to indicate they lived near a waterbody (Cramer's V = .283; Table E-1) and respondents with the most education were most likely to live near a waterbody while those with a high school degree or less were least likely to live near a waterbody (Cramer's V = .132; Table G-1).

Concern about water quality was measured through the following question: "I'd like to know how concerned you are with pollution and environmental quality in your local streams and waterways: Would you say you are very concerned, somewhat concerned, not very concerned, or not at all concerned?"

Respondents expressed a high level of concern about the water quality of local streams and rivers (Table D-2). Nearly 84% of respondents indicated they were "very concerned" or "somewhat concerned" about pollution and the environmental quality of local waterways. This level of concern is comparable to the extent of concern found in other regions of the country (see Center for Watershed Protection, 1999).

Subgroup analyses of this question reveal several patterns. Males were more concerned than females about water quality with 79.4% of males indicating they were "very concerned" or "somewhat concerned" as compared to 68.9% of females (Cramer's V = .120; Table E-2). Whites expressed more concern than minorities about pollution and environmental quality, with 82.7% of whites and 65.4% of minorities to indicate they were "very" or "somewhat" concerned. (Cramer's V = .197; Table F-2). Individuals with some college or a two-year degree were more concerned about the environment than those with lower or higher levels of education (gamma = -.750; Table G-2). Individuals between the ages of 35-54 were more concerned than younger or older respondents about pollution and the environmental quality of local waterways (gamma = -.615; Table H-2). By far, the youngest respondents (18-34 year olds) expressed the least concern

about water quality. Slightly more than 58% of 18-34 year olds said they were "very" or "somewhat" concerned about water quality as compared to 91.8% of 35-54 year olds. There were no statistically significant differences between renters and owners in their level of concern about the environment.

Respondents were then asked to indicate to what extent they thought people's actions affected water quality. Overall, nearly 47% of respondents indicated that people's actions had "a great deal" of impact on water quality (Table D-3). However, nearly 1/4 (24.5%) of respondents indicated that people's actions affected water quality "not too much" or "not at all." While there were no differences by gender in perceptions of whether people's actions affect the environment, there were racial, education, age and home ownership differences. Whites (87.0%) were more likely than minorities (61.0%) to indicate that people's actions affected water quality a "great deal" or "somewhat" (Cramer's V= .294; Table F-3). The higher an individual's education level, the more likely they were to indicate that people's actions affected the quality of water "a great deal" or "somewhat" (94.6% of college graduates vs. 58.5% of those with a high school education or less) (gamma = -.672; Table G-3). Individuals who were 35-54 years old were most likely to indicate that people's actions affected waterways "a great deal" or "somewhat", while the youngest respondents were least likely to say so. This relationship was very strong, as indicated by the gamma value of -.742 (Table H-3). Owners (78.5%) were more likely than renters (64.6%) to indicate that what people did on land had a "great deal" or "somewhat" of an impact on water quality (Cramer's V = .152; Table I-3).

Environmental Knowledge

Respondents' level of knowledge about water quality issues was measured in three ways: (1) through a series of questions about the respondent's knowledge about practices used to manage land along rivers, streams, and lakes; (2) two questions about the specific practices of inspection and pump out of septic tanks and the treatment of stormwater; and (3) a question on the definition of the term "watershed."

Knowledge of Practices for Protecting Land Along Waterways

A common goal of many environmental education programs is to educate residents about practices that can help to improve water quality or mitigate the impact of erosion. In this survey, respondents were asked to indicate their level of knowledge by responding to the following question about the effectiveness of four practices in managing land along rivers and lakes: "River banks and lake fronts are obvious places to think about water quality issues. In your opinion, how effective are the following measures in managing land along a river or lake in an environmentally-friendly way?" The four practices were: allowing natural vegetation to grow wild; keeping grass or other vegetation mowed to the edge of the water; planting bushes or shrubs; and installing a retaining wall or bulkhead.

Overall, 77% of respondents correctly indicated that allowing natural vegetation to grow wild was "very" or "somewhat" effective at managing land along a river or lake in an environmentally-friendly way (Table D-8). Nearly 71% recognized keeping vegetation mowed to the edge of the water as a "very effective" or "somewhat effective" practice. However,

slightly more 81% of respondents indicated that planting bushes and shrubs was a "very" or "somewhat" effective practice. Respondents were least likely to indicate that "installing a retaining wall or bulkhead" was a "very" or "somewhat" effective way to manage land along a river or lake, although 62% indicated this was the case.

The percentage of respondents indicating they did not know about the effectiveness of some of these various measures (or, did not respond to the question) was quite high: 11% for "allowing natural vegetation to grow wild," 12.5% for "keeping vegetation mowed," and 16.8% for "installing a retaining wall or bulkhead."

Regarding subgroup differences, there were statistically significant differences by sex for keeping grass mowed (Cramer's V = .212; Table E-17) and planting bushes and shrubs (Cramer's V = .184; Table E-18), with females more likely than males to rank these practices as "very effective" for maintaining land along a waterway (although males were much more likely than females to rate these two practices as "somewhat effective." There were racial differences for all four questions with whites being more likely than minorities to rank the four practices as "very effective" for managing land along water bodies (Tables F-16 through F-19). Minorities were far more likely than whites to rate three of the practices (keeping vegetation mowed, planting bushes and shrubs, and installing a retaining wall or bulkhead) as "not at all effective." And, as measured by the Cramer's V values for each item, these relationships are quite strong.

Similar strong and moderately strong relationships were noted for education. However, the pattern for education was not as consistent as it was for race. Individuals with the highest levels of education were more likely to rate allowing natural vegetation to grow wild as "very effective" (68.9% of college graduates as compared to 38.5% of **?). Notably, only 5.6% of college graduates rated this practice as "not at all effective", as compared to 38.5% of those with a high school degree or less (gamma = -.442; Table G-16). Those with the least education were also more likely than those with higher educational attainment levels to rate planting bushes and shrubs and installing a retaining wall or bulkhead as "not at all effective" (Tables G-18 and G-19, respectively). However, for the item "keeping grass or other vegetation mowed to the edge of the water" those with a high school degree or less were more likely to rate this as a "very effective" practice (36.7% of high school grads or less as compared to 19.8% of college graduates and 19.0% of those with some college or a two-year degree) (gamma = .283; Table G-17).

Individuals age 18-34 were more likely than respondents in other age groupings to rank allowing natural vegetation to grow wild (gamma = -.437; Table H-16), planting bushes and shrubs (gamma = -.155; Table H-18) and installing a retaining wall or bulkhead (gamma = -.412; Table H-19) as "not at all effective."

In terms of home ownership status, owners were more likely than renters to indicate that keeping grass or other vegetation mowed to the edge of the water was "not at all effective" for maintaining land along a river or lake in an environmentally-friendly way (gamma = .306; Table I-17). Renters were more likely than owners to indicate that installing a retaining wall or bulkhead was "not at all effective" (gamma = -.284; Table I-19).

In this section of the survey, respondents were also asked the following open-ended question: "In your opinion, are there any other effective measures that could be used to manage land along a river or lake?" Nearly 100 suggestions for managing land along the water's edge were provided (see Table J-1 for a list of some of these suggestions). Many of these responses were related to pollution or litter control (e.g., "minimize pollution and dumping," "cleaning up litter along roadways and shores"). Other respondents described using more "natural" strategies (e.g., "let nature take its course" and "keep the area as natural as possible").

Knowledge of Additional Practices

Respondents were also asked about their knowledge concerning two additional practices: inspection and pump out of septic tanks and the treatment of stormwater.

Nearly 65% of respondents indicated they "strongly agreed" or "agreed" that inspection and pump out of septic tanks protects water quality (Table D-4). However, slightly more than 1/5 of respondents (20.8%) indicated "do not know" for this question. And, with the exception of homeownership status, there were statistically significant differences across all subgroups for this question. Males were more likely than females (Cramer's V = .150; Table E-4), whites more likely than minorities (Cramer's V = .111; Table F-4), the most highly educated were more likely than those with lower levels of education (gamma = -.270; Table G-4), and 35-54 year olds were more likely than individuals from other age groups (gamma = -.302; Table H-4) to "strongly agree" or "agree" that inspection and pump out of septic tanks improves water quality.

To gauge knowledge about stormwater, respondents were asked whether they believed that stormwater is treated before reaching local lakes, streams, and beaches. Respondents were first provided with a basic definition of stormwater as "runoff from yards and roads during storm events or from irrigation; it drains to ditches and storm sewers along roadways." Respondents were then asked to indicate "yes" or "no" in response to the question "do you believe that this stormwater is treated before reaching our lakes, streams and beaches?"

Seventy-seven percent of respondents believed that this water is not treated, while 18.7% indicated that "yes, it is treated." Slightly more than 4% of respondents indicated "do not know" for this survey item (Table D-6).

Subgroup differences for this item were found for all sociodemographic groups except for race. An overwhelming majority (92.1%) of females felt the stormwater was treated (as compared to slightly more than 2/3 (67.9%) of males) (Cramer's V = .306; Table E-6). Individuals with a mid-level of education (some college or a two-year degree) were most likely to indicate that the stormwater is not treated (Cramer's V = .130; Table G-6). Individuals with a high school education or less were most likely to indicate it was treated (nearly one-fourth of these respondents as compared to 14.0% of those with a mid-level of education and 15.2% of those with a bachelor's degree or more).

Individuals 18-34 years old were most likely and individuals age 65 and older were least likely to indicate that the stormwater was treated (24.7% of 18-24 years olds vs. 7.5% of individuals age 65 and older) (Cramer's V = .149; Table H-6). Regarding homeownership status, renters were more likely than homeowners to indicate that they believe that stormwater is treated (29.2% vs. 13.8%, respectively) (Cramer's V = .187; Table I-6).

Definition of Watershed

To ascertain another dimension of environmental knowledge, survey respondents were asked the following multiple choice question: "Of the following, which best fits your definition of what a watershed is: Is it an area that retains water like a swamp or a marsh, all of the land area that drains into a specific river or lake, a reservoir that serves as a municipal water source, a small building where water is stored, or none of the things I've mentioned?" This question has been asked on a number of other environmental surveys, allowing for comparison of tri-county residents with residents from other areas.

When asked to choose the correct definition of the term "watershed," nearly 30% of respondents selected the correct answer ("area that drains into specific river or lake") and nearly 21.5% indicated they did not know the correct definition (Table D-9). An equal percentage of respondents (14.7%) selected either "a reservoir that serves as a municipal water source" or "a small building where water is stored" as the correct definition. Several other surveys on environmental issues document much higher levels of knowledge about the definition of a watershed. For example, in a survey of Chesapeake Bay watershed residents, nearly half (48%) of respondents chose the correct definition. In a 1997 Roper survey, 40% of respondents identified the correct definition of watershed (see McClafferty, 2002). Thus, the results of the current survey indicate that the watershed concept remains abstract and confusing for many tri-county residents.

As indicated in Table J-2, some respondents have their own working definition of the term "watershed," some of which are closely related to the actual definition (e.g., "everything that drains into the water), and others that are not at all related to the actual definition (e.g., "storage shed," "where they treat the water," and "where you store drinkable water"). One respondent expressed a more personal definition of watershed that was related to the protection of water quality: "Place that should be left alone because we need these to protect the land that we build on…or else the property will be destroyed."

Regarding subgroup differences in this basic knowledge about watersheds, males were more likely than females to choose the correct definition, with 41.9% of males choosing the correct definition as compared to 18.4% of females. Similarly, slightly more than 1/3 of females (34.7%) indicated they did not know the definition as compared to just 6.5% of males (Table E-20). The relationship between gender and knowledge was very strong (Cramer's V=.426). Regarding race, whites were more likely than minorities to choose the correct definition (41.3% vs. 18.8%) (Cramer's V = .372; Table F-20). Minorities were much more likely to select "small building where water is stored" and "an area that retains water, like a swamp or marsh." Whites were much more likely than minorities to indicate they did not know the definition of the term "watershed."

A moderately strong relationship was evident for age. Individuals age 65 and older were more likely than individuals from the other age groups to select the correct definition – 42.4% of those age 65 and older, as compared to 23.2% of those age 18-34 (Cramer's V = .214; Table H-20). Individuals age 35-54 were least likely to indicate "do not know" for this survey item.

Beliefs about Sources of Water Pollution

To gauge respondents' knowledge about water pollution, respondents were asked to assess the extent to which the following nine practices impacted the quality of local streams and lakes: fertilizers and lawn chemicals that people use on their lawns and gardens; fuel and oil leaks from trucks, buses or automobiles; pet waste; waste from birds; runoff from people washing their cars; industrial sites; farm operations; sediment or dirt from construction sites; and parking lot runoff. One additional question ascertained the extent to which respondents believed that a more specific source (pet waste) contributed to bacteria pollution in lakes, rivers and streams.

Impact of Pollution on Local Streams and Lakes

Industrial sites were identified as having the greatest impact on water quality (Table D-7). Nearly fifty-seven percent of respondents indicated industrial sites had a "great" impact on water quality. The data also showed the following large percentages (in parenthesis) of respondents who indicated the other sources of pollution had a "great" impact on water quality: fuel and oil leaks from trucks, buses or automobiles (54.9%), fertilizer and lawn chemicals that people use on their lawn and garden (51.4%), and farm operations (37.9%). A relatively small proportion of respondents indicated that pet waste (16.8%) and waste from birds (12.0%) had a "great impact" on the water quality of local streams and lakes. Regarding waste from birds, nearly 27% of respondents indicated that bird waste had no impact on the quality of local waterways. Slightly more than 46% of respondents felt that pet waste had no impact on the quality of local waterways.

There were some important subgroup differences in the assessment of the impacts of these nine sources of water pollution. Females were more likely than males to indicate that three practices had a "great" or "some" impact on water quality: pet waste (Table E-9), waste from birds (Table E-10), and sediment or dirt from construction sites (Table E-14). On the other hand, males were more likely than females to indicate that runoff from people washing their cars (Table E-11) and parking lot runoff (Table E-15) had "great" or "some" impact on water quality. The relationship between gender and assessment of the impact of these five factors on water quality was moderately strong to strong, as indicated by the Cramer's V values of between .137 (for parking lot runoff) to .295 (for runoff from people washing their cars).

Regarding the statistically significant racial differences, for five survey items, minorities were more likely than whites to indicate that all five sources of pollution had a "great" or "some" impact on water quality of local waterways: fuel and leaks (Table F-8), pet waste (Table F-9),

waste from birds (Table F-10), runoff from people washing their cars (Table F-11), and sediment or dirt from construction sites (Table F-14). The relationships between race and assessment of impact were moderately strong, with Cramer's V's ranging from .166 (for runoff from people washing their cars) to .195 (for pet waste).

Regarding education, as education level increased, respondents were more likely to indicate that fertilizers and lawn chemicals and farm operations had a "great" or "some" impact on local streams and lakes. The relationship between education and assessment of impact of these two sources of pollution were very strong, with gammas of -.362 and -.381, respectively (Tables G-7 and G-13, respectively). While those with the highest level of education were most likely to indicate that industrial sites had a "great" or "some" impact on water quality (91.3%), a higher proportion of individuals with the lowest levels of education (86.6%) than those with a mid-level of education (76.9%) indicated this level of impact for industrial sites, although the strength of the relationship was weak (gamma = .003; Table G-12).

There were statistically significant differences between age groups in the assessment of the impact of six of the nine sources of pollution (Tables H-7 through H-15). Individuals age 18-34 were least likely indicate that fertilizers and lawn chemicals, pet waste, waste from birds, and parking lot runoff had a "great" or "some" impact on local streams or lakes. Individuals 65 years of age and older were least likely to indicate that runoff from people washing their cars and industrial sites had a "great" or "some" impact on local streams or lakes. The relationships between age and the assessments of impact were moderately strong to strong, with gamma values ranging from .152 (for industrial sites) to -.257 (for pet waste). The one exception was for runoff from people washing their cars, for which the gamma value (.021) was weak.

Renters and owners differed significantly in their assessment of the impact of seven of the nine sources of pollution (see Tables I-7 through I-15). Renters were more likely than owners to indicate that all seven of these items (fertilizers/chemicals, fuel and oil leaks, pet waste, waste from birds, runoff from people washing cars, farm operations, and parking lot runoff) had a "great" or "some" impact on water quality. The relationship between homeownership status and assessment of impact was moderately strong to very strong, with Cramer's V's ranging from .123 (for fertilizers and lawn chemicals) to .304 (for parking lot runoff). Renters and owners were equally likely to rate industrial sites and sediment or dirt from construction sites as having a "great" or "some" impact on the environment (as indicated in Tables I-12 and I-14, respectively).

Beliefs about the Impact of Pet Waste on Water Quality

Respondents were also asked to what extent they agreed that pet waste is a source of bacteria pollution in lakes, rivers or streams. Slightly more than 2/3 of respondents (67.4%) indicated they "strongly agreed" or "agreed" with this statement (Table D-5). Nearly 12% of respondents indicated they did not know if pet waste was a source of bacteria pollution in waterways.

Regarding subgroup differences for this survey item, females were more likely than males (Cramer's V = .152; Table E-5), minorities were more likely than whites (Cramer's V = .125; Table F-5), and owners were more likely than renters (Cramer's V = .116; Table I-5) to "strongly agree" or "agree" that pet waste is a source of bacteria pollution in lakes, rivers, and streams.

Environmental Behaviors

The survey measured environmental behaviors by asking respondents: (1) about their frequency of participation in outdoor recreational activities; (2) whether they engaged in several positive behaviors in the past two years; and (3) about their level of participation in a variety of household-related behaviors.

Participation in Outdoor Recreational

Research has demonstrated a relationship between participation in outdoor activities and beliefs about and behaviors toward the environment. The results for this section of the survey can thus provide some insights into how connected tri-county residents are to outdoor hobbies and can help environmental organizations to target outreach activities. Respondents were asked about their frequency of participation in seven recreational activities: kayaking/canoeing, fishing, swimming in rivers or lakes, motorboating, visiting the beach, hiking/walking in parks or other protected land, and hunting/trapping.

As indicated in Table D-10, visiting the beach, hiking, and fishing were the three most popular recreational activities for respondents (with 53.2%, 50.9%, and 33.4% of respondents indicating they participated in these activities "often" or "sometimes", respectively). The lowest participation rates were recorded for hunting/trapping and kayaking/canoeing (only 8.1% and 5.8% of respondents indicating they participated in these activities "often" or "sometimes", respectively). Similarly, a nearly equal proportion of respondents indicated they had they had "never" participated in swimming (64.0%) and motorboating (63.9%).

The results indicate a number of subgroup differences in levels of participation in the various recreational activities. For four activities, males were much more likely than females to indicate they "often" or "sometimes" participated in the activity: fishing (Table E-22), swimming (Table E-23), motorboating (Table E-24), and hiking (Table E-26). The relationships between gender and participation in recreational activities were moderately strong to strong, with Cramer's V's ranging from .103 (for hiking) to .301 (for fishing). Men and women were equally likely to participate (or, to not participate) in kayaking/canoeing, visiting the beach and hunting/trapping.

Regarding race, whites were more likely than minorities to participate "often" or "sometimes" in motorboating (Cramer's V = .205; Table F-24) and hunting/trapping (Cramer's V = .137; Table F-27). However, minorities were more likely than whites to "often" or "sometimes" visit the beach (Cramer's V = .116; Table F-25) and to hike or walk in parks or other protected areas (Cramer's V = .205; Table F-26).

There was also a moderately strong or strong relationship between education and participation in six of the seven outdoor activities (Tables G-22 through G-26). There was a positive relationship between education and kayaking/canoeing (Table G-21), motorboating (Table G-24) and hiking/walking (Table G-26): those with higher levels of education were more likely to indicate they participated in these two activities "often" or "sometimes" as compared to individuals with lower levels of education (with gammas of -.150, -.385, and -.179, respectively). Individuals with some college or a two-year degree were more likely than individuals with lower levels or

higher levels of education to participate in fishing "often" or "sometimes" (gamma = -.243; Table G-22). And, individuals with the least education (high school diploma or less) were much more likely than others to indicate they "never" participated in swimming (gamma = -.324; Table G-23) and visiting the beach (gamma = -.417; Table G-25).

As indicated in Tables H-21 through H-27, the relationships between age and recreational participation for four of the seven activities (fishing, swimming, visiting the beach, and hiking) were statistically significant and moderately strong, with gammas ranging from .187 (for swimming) to .262 (for visiting the beach). The relationship was weak for participation in hiking, however. And, the age pattern of participation was consistent across all four of these activities: individuals age 35-54 were most likely to participate "often" or "sometimes", while individuals 65 and older were least likely of all age groups to participate "often" or "sometimes."

Renters were more likely than owners to indicate they "often" or "sometimes" participated in two of the seven activities: fishing (Cramer's V = .093; Table I-22) and hiking (Cramer's V = .170; Table I-26), although the relationship was weak for fishing. Owners were more likely than renters to indicate they "often" or "sometimes" used a motorboat (Table (I-24) and visited the beach (Table I-25); the relationship for both of these variables was moderately strong (Cramer's V = .240 and .174, for these two activities, respectively).

Participation in More General Positive Behaviors

A major goal of many environmental education efforts is to promote environmentally-friendly behaviors among residents. Tri-county respondents were asked whether they had participated in each of four specific behaviors in the previous two years: reducing water usage out of concern for drought conditions; reducing water usage out of concern for water quality; participating in a lake, river, or roadside clean-up; and joining or volunteering for a conservation or environmental organization. It should be noted that when reporting on their own actions, individuals may feel compelled to provide the most socially acceptable response, even for telephone surveys. Thus, engagement in positive behaviors may be over-reported by survey respondents.

The results indicate that tri-county residents did participate in a number of environmentally-friendly behaviors in the previous two years (Table D-11). The participation rates were highest for reducing water usage during times of drought (72.3% of respondents indicating "yes" to this question), followed by reducing water usage out of concern for water quality (40.2%), participating in a clean-up event (30.2%) and joining or volunteering for a conservation or environmental organization (18.1%). Regarding the latter item, Table J-3 indicates that respondents are involved in a broad variety of local organizations (Coastal Conservation League and Keep S.C. Beautiful) and national organizations (Nature Conservancy and National Resource Defense Council).

Regarding subgroup differences, there were significant differences between men and women for all four activities. Men were more likely than women to indicate they participated in a lake, river or roadside clean-up event (Cramer's V = .103; Table E-30) and joined or volunteered for an

environmental organization (Cramer's V = .155; Table E-31) in the past two years. Women were more likely than men to indicate they reduced water usage either out of concern for drought conditions (Cramer's V = .132; Table E-28) or out of concern for water quality (Cramer's V = .125; Table E-29).

Minorities were more likely than whites to indicate they had participated in two activities in the previous two years: reducing water usage out of concern for drought conditions (Cramer's V = .095, a weak relationship; Table F-28) and reducing water usage out of concern for water quality (Cramer's V = .139; Table F-29). Otherwise, whites and minorities were equally likely to indicate they had, or had not, participated in clean-up activities or joined an environmental organization in the past two years.

Statistically significant educational differences in participation were observed for the two activities related to water usage. Individuals with the lowest levels of educational attainment (high school or less) were more likely to indicate they had not reduced water usage out of concern for water quantity (Cramer's V = .153; Table G-28) or quality (Cramer's V = .269; Table G-29). Individuals with a mid-level of education were especially more likely than either educational group to indicate they had reduced their water usage because of concerns about water quality (Table G-29).

Participation in positive behaviors varied by age for the activities related to volunteering for a clean-up event (Cramer's V = .225; Table H-30) and joining an environmental organization (Cramer's V = .183; Table H-31). Individuals age 35-54 were most likely to participate in a community clean-up event while younger individuals (age 18-34) were most likely to join an environmental organization. For both activities, individuals 65 years of age and older were least likely to indicate they participated in these two activities.

There were no statistically significant differences between owners and renters in whether or not they had participated in these four activities.

Participation in Household-Level Environmental Behaviors and Practices

Respondents were asked to rate their level of participation, in the past two years, in seven household-based activities: considered the likelihood of rain before treating the lawn with fertilizer or pesticide; picked up after their pet while taking their pet for a walk; operated a vehicle with a motor oil leak; disposed of oil, paint, or other chemical down storm drains; washed their care on the lawn or gravel instead of pavement; dumped grass clippings or leaves down storm drains or backyard creeks; and stored fertilizers or pesticides in leaking containers.

Results for this section of the survey indicate that, at the household level, tri-county residents seemed to be participating in positive environmental behaviors and refraining from participating in negative household behaviors (Table D-15). Nearly 3/4 of respondents (73.9%) indicated they "always" or "nearly always" considered the likelihood of rain before treating their lawns with fertilizers or pesticides. Slightly more than 86% of respondents with pets said they "always" or "nearly always" cleaned up after their pets. A large majority of respondents indicated they "never" participated in potentially negative activities, including operating a motor vehicle with a

leak (86.0%), dumping grass clippings down storm drains or backyard creeks (93.8%), stored fertilizers and pesticides in leaking containers (95.8%), and disposing of oil, paint, or other chemicals down storm drains (96.0%). These figures reflect national trends which indicate that between 1% and 5% of residents dump oil or water down storm drains (Center for Watershed Protection, 1999). It is noted, however, that only 21.4% of respondents indicated that they "always" or "nearly always" washed their car on the lawn or gravel instead of pavement.

There were a number of statistically significant subgroup differences in participation rates for these behaviors. Sex differences were observed for all seven behaviors. Regarding the more positive behaviors, males were more likely than females to "always" or "nearly always" consider the likelihood of rain before using fertilizers or pesticides (Cramer's V = .183; Table E-34) while females were more likely than males to "always" or "nearly always" pick up after their pets (Cramer's V = .162; Table E-35). Males were more likely than females to indicate they "always" or "nearly always" washed their car on the lawn or grass instead of pavement (Cramer's V = .172; Table E-38). Regarding potentially more negative behaviors, females were more likely than males to indicate they "always" or "nearly always" operated a vehicle with a motor leak (Cramer's V = .189; Table E-36), disposed of oil, paint or other chemicals down storm drains (Cramer's V = .166; Table E-37), dumped grass clippings down storm drains (Cramer's V = .137; Table E-39) and stored pesticides or fertilizers in leaking containers (Cramer's V = .180; Table E-40).

Statistically significant racial differences were observed for four of the seven items. Minorities were more likely than whites to indicate they "always" or "nearly always" cleaned up after their pet (Cramer's V = .190; Table F-35). And, minorities were more likely to indicate "always" or "nearly always" disposing of oil, paint or other chemicals improperly (Cramer's V = .123; Table F-37), washing their car on lawn or gravel instead of pavement (Cramer's V = .110; Table F-38), and improperly storing fertilizers and pesticides (Cramer's V = .151; Table F-40).

Regarding educational differences, individuals with the most education (bachelor's degree or higher) were most likely to indicate that they had "always" or "nearly always" picked up after their pet (gamma = -.123; Table G-35); individuals with the mid-level of educational attainment were much more likely to indicate they "hardly ever" or "never" picked up after their pet. Individuals with a high school education or less were much more likely than individuals with higher levels of education to indicate they "always" or "nearly always" operated a vehicle with a motor oil leak, and this relationship was very strong with a gamma value of .587 (Table G-36). And, there was an inverse relationship between education level and likelihood of washing cars on lawns or gravel instead of pavement: the lower the level of education, the more likely respondents indicated they "always" or "nearly always" did this in the previous two years (gamma = .248; Table G-38).

For all seven activities, no statistically significant differences between age groups were observed. Individuals across all age groups were equally likely to indicate they had, or had not, participated in each of the seven activities.

More than twice as many renters as owners indicated they "always" or "nearly always" washed their car on the lawn or gravel instead of pavement (Cramer's V = .234; Table I-38). Renters were also more likely than owners to indicate they "always" or "nearly always" improperly disposed of yard waste (i.e., grass clippings or leaves) (Cramer's V = .123; Table I-39).

Information about Additional Household Practices

In the interest of developing more targeted environmental education efforts, respondents were asked several additional questions about household behaviors. Respondents provided information about who is responsible for two major household activities that could potentially impact the environment: mowing the lawn and fertilizing the lawn. Slightly more than three-fourths (76.7%) of respondents indicated that they or another household member were responsible for mowing the lawn (Table D-12). However, slightly more than 31% of respondents indicated that the task of fertilizing the lawn was handled "in-house"; for nearly 24% of respondents, this task was handled by someone outside the household (Table D-13). Importantly, nearly 45% of respondents indicated that they did not use fertilizers.

Males were more likely than females (Cramer's V = .228; Table E-33) and whites were more likely than minorities (Cramer's V = .280; Table F-33) to indicate that they or another household member were responsible for fertilizing the lawn. Individuals with a high school education or less were more likely than other respondents to indicate that they or another household member were responsible for mowing the lawn (Cramer's V = .191; Table G-32).

In terms of age differences, individuals age 18-34 were most likely to indicate that they or another household member were responsible for mowing the lawn; individuals 65 years of age and older were least likely to indicate this was the case (Cramer's V = .181; Table H-32). Individuals age 35-54 were most likely to indicate that they or someone from the household was responsible for fertilizing the lawn, while individuals 65 years of age and older were least likely to indicate this was the case (Cramer's V = .232; Table H-33).

Owners were more likely than renters to indicate that they or another household member were responsible for fertilizing the lawn (Cramer's V = .152; Table I-33).

Those individuals who indicated they did use fertilizers or pesticides used a variety of techniques for determining how much fertilizer or pesticide to use (Table D-14). When looking at the top three responses, the most frequently cited source of information (selected by 22.3% of respondents) was by reading the product information and instructions on the bag or container. Much smaller proportions of respondents indicated they either used other methods (7.2%) or relied on lawn care company recommendations (4.0%).

Regarding the disposal of household chemicals such as paint or paint thinners, cleaners or pesticides, respondents were most likely to take them to the landfill on appointed days (45.2% of respondents) or to put them in the trash (25.5%) (Table D-17). Table J-4, which lists "other" ways of disposing of these materials, reveals a wide variety of practices and behaviors, ranging from using up the products until they are gone to buying environmentally-friendly paints or "eco-friendly" cleaners.

For those respondents with a septic tank, slightly more than one-third of respondents (34.3%) indicated they had never had their septic tanks inspected or pumped out over the previous five years and 12.5% indicated they had done so twice in the previous five years. Importantly, an even higher proportion (39.5%) indicated "do not know" when asked this question (Table D-16).

Sources of Local and Regional Information and News

In the interest of learning more about how residents might obtain information about the environment and water quality issues, respondents were asked to list the three primary sources of local and regional news and information and whether they used the Internet to obtain regional and local information and news.

Table D-21 reveals respondents' top three primary sources of local and regional information and news. The three most frequently selected sources of information were TV evening news (62.4%), TV morning news (60.7%) and local newspapers (44.8%). The radio was also a particularly important source of local and regional information and news: 29.4% of respondents selected general radio stations and 22.6% of respondents selected public radio as one of their three primary sources of information. Regional newspapers were another popular source of information, with 31.6% of respondents selecting this option as one of their three primary sources of information. Billboards and posters and events/workshops were the least likely to be selected as a source of information and news (selected by 2.4% and 0.8% of respondents, respectively).

When asked whether there was some other important source of information and news not mentioned in the list provided to them, respondents provided a variety of answers. Table J-7 indicates that respondents obtain regional and local news and information through several different channels, including conversation and word-of-mouth, their work environment, radio, and major television shows, such as CNN and the BBC.

A majority (56.1%) of respondents indicated they used the Internet to get their local and regional information and news (Table D-22). Obtaining local or regional information through the Internet was related to gender, education, age, and homeownership status. Males (63.6%) were more likely than females (49.8%) to use the Internet(Cramer's V = .139; Table E-48); the more education one had, the more likely they were to indicate they used the Internet (Cramer's V = .221; Table G-48); 2/3 (66.9%) of 35-54 year olds vs. just 30.2% of individuals 65 years old and older used the Internet for regional information and news (Cramer's V = .228; Table H-48); and renters (74.1%) were more likely than home owners (46.0%) to use the Internet (Cramer's V = . 269; Table I-48). Minorities and whites were equally likely to use the Internet as an information source.

Awareness of Environmental Organizations

Respondents were asked to what extent they were familiar with Carolina Clear and the Ashley Cooper Stormwater Education Consortium. Overall, there is a low level of awareness of these two organizations. Only 7.8% of respondents indicated they had heard of Carolina Clear and were either familiar or not very familiar with the agency's programs (Table D-19). And, 15.7% of respondents indicated a similar level of familiarity with the Ashley Cooper Stormwater Education Consortium (Table D-20). For those respondents who had heard of either agency, Table J-5 and Table J-6 reveal that respondents had heard of these organizations from a variety of sources, including family and friends who had a connection with Clemson University and local media sources.

The data reveal that, with the exception of gender (for Carolina Clear), there are no particular sociodemographic differences in awareness of either of these groups. That is, respondents, regardless of gender, race, education, age, and homeownership status, were equally familiar with (or, in this case, as equally unfamiliar with) Carolina Clear and the Ashley Cooper Stormwater Education Consortium. The one exception is that females were more familiar than males with Carolina Clear, with 10.5% of females being familiar with Carolina Clear and its programs (or having heard of Carolina Clear), as compared to 4.2% of males (Cramer's V = .119; Table E-46).

Likelihood of Future Involvement in Water Quality Issues

Survey respondents were asked to indicate the likelihood that they would get involved with water resource issues if five scenarios occurred: if they had more information about water quality issues in the area; if they knew the local government could save money in the long run by taking action to improve water quality; if local newspapers or television stations ran stories on local water pollution problems; if local newspapers or television stations ran stories on positive actions taken by local residents to improve water quality; and if they were being directly affected in some way by water pollution. As was the case for participation in positive behaviors, caution should be used in interpreting these results for respondents may have overstated their likelihood of participation in efforts to improve water quality. Nonetheless, some interesting findings emerge.

The high level of concern among tri-county residents for water quality is generally matched by a high level of willingness to become involved in water resource issues. The proportion of respondents who indicated they were "somewhat likely" or "very likely" to get involved exceeded 75 percent for each of the five scenarios (Table D-18). Respondents would be most likely to get involved if they were personally affected, with 96.5% of respondents indicating they would "very likely" or "somewhat likely" become involved if they were being directly impacted by water pollution. Providing more information about water quality issues and knowing the local government could save money in the long run by taking actions to improve water quality would also motivate respondents to become involved in water resource issues, with 92.3% and 81.9% indicating they would "very likely" or "somewhat likely" become involved, respectively.

Concerning demographic differences in likelihood of getting involved, there was a statistically significant relationship between gender and likelihood of becoming more involved in water resource issues for two items: males were more likely than females to become involved if they knew the local government could save money in the long run by taking action to improve water quality (Cramer's V = .198; Table E-42), while females were more likely than males to become involved if local newspapers featured stories on local water pollution problems (Cramer's V = -.165; Table E-43).

There were statistically significant differences between whites and minorities for all five items (Tables F-41 through F-45). For all five items, minorities were more likely than whites to indicate they would "very likely" or "somewhat likely" become involved in water quality issues. The relationship between race and likelihood of involvement ranged from moderately strong (Cramer's V = .120 for the item about local government saving money) to very strong (Cramer's V = .428 for the item about the media featuring stories on water pollution problems).

Regarding education level, statistically significant relationships were found for two items. Individuals with a high school degree or less were most likely to indicate they would "very likely" or "somewhat likely" become involved if they had more information about water quality issues (gamma = -.329; Table G-41). And, individuals with a mid-level of education (some college or a two-year degree) were more likely than individuals with less or more education to indicate they would "very likely" or "somewhat likely" become involved in water resources issues if the local media featured stories on positive actions taken by local residents to improve water quality (gamma = -.148; Table G-44).

Significant differences and moderately strong to very strong relationships were found between age groups for three of the five survey items. Individuals age 18-34 were most likely to indicate they would "very likely" or "somewhat likely" involved if they had more information about local water quality issues (gamma = .623; Table H-41) and if the local media featured stories on water pollution problems (gamma = .232; Table H-43). Individuals age 35-54 would be the most motivated of all age groups to become involved if they knew the local government could save money in the long run by taking action to improve water quality (gamma = .163; Table H-42), although the gamma value was not statistically significant for this item.

For all five items, renters and owners differed in their self-assessment of willingness to become involved in water resource issues. For all five items, renters were more likely than owners to indicate they would "very likely" or "somewhat likely" become involved (Tables I-41 through I-45). The relationship between homeownership status and likelihood of involvement was moderately strong to strong, with Cramer's V's ranging from .115 (for becoming involved if they were directly affected) to .351 (for the local media running stories on positive actions taken by local resident to improve water quality).

Recommendations

The survey results provide rich information about the views and opinions of residents of Charleston, Berkeley and Dorchester residents on environmental and water quality issues. This report has highlighted some of the key findings, as measured by the question frequencies and crosstabulation analyses. The survey results offer some initial guidance as to how such an education effort in the tri-county region could proceed. The results also have implications for how Carolina Clear and other environmental organizations can communicate with citizens about water quality issues. Below are some of the major recommendations that emerge from this survey effort.

General Observations and Recommendations

- A predominant theme in the research data was the importance of the water resources to local residents. There is a high level of concern about water quality on the part of the tri-county residents, with nearly 3/4 (73.8%) of tri-county residents indicating they were "very" or "somewhat" concerned about pollution and the environmental quality of local waterways. This high level of concern provides an important starting point for environmental education and for nurturing a dedication to place that is so important for these kinds of efforts.
- Knowledge about watersheds provides a basis for the development of an "environmental consciousness" among local residents. Survey results suggest that education about the basics of watershed principles would go a long way toward developing this level of connection. While concern among residents of the tri-county area was high and comparable to levels of concern in other watersheds, knowledge about watershed basics was quite low. The ability of tri-county residents to identify the correct definition of "watershed" was far below the level of knowledge recorded in other areas of the country. Clarification of the basics of watersheds will help residents to better understand how their practices impact watershed health, both upstream and downstream.
- Better education efforts regarding how water flows across the landscape and about the basics of watersheds could improve appreciation for the complexity of the water quality issues. Efforts such as watershed signs may help to better inform residents about the boundaries of the watershed and help to shape a "watershed identity." Additional measures should also be taken to inform residents about the localized nature of watersheds, in terms of the extent and nature of local streams and waterway in their own neighborhoods and how these tributaries connect to the watershed as a whole. Such knowledge could lead to more concern and action on the part of local citizens.
- Successful environmental education and integrated watershed management relies on the development of a common knowledge base and understanding about causes of water quality problems. The data reveal some disparities in respondent perceptions about the impacts of various sources of pollution. Local residents could benefit from additional information about the interrelatedness of the various causes of pollution. For example, survey results suggest that tri-county residents would benefit from more information about the impact on water quality of pet waste and runoff from parking lots and from people washing their cars. However, respondents seemed to be particularly knowledgeable about the impact of fertilizers and pesticides on water quality.

- An encouraging sign is the fact that tri-county residents are quite willing to get involved in efforts to improve water quality, when compared to individuals in other areas of the country (McClafferty, 2002). For example, nearly 48% of tri-county respondents indicated they would "very likely" become involved if they knew the government could save money, but a much greater proportion of respondents (82.3%) would become involved if they were directly impacted in some way by pollution. So, it is not only the "pocketbook issues" that will impact local residents and prompt them to translate concern into action. Environmental educational efforts that highlight how environmental degradation impacts individuals could be especially effective for promoting citizen involvement in water quality issues.
- Residents could benefit from additional information about the resources and information available through organizations and groups like Carolina Clear. This is especially the case given that a significant proportion of respondents indicated they would be willing to become involved in efforts to protect water quality, especially if they were provided with additional information about local water quality issues.
- When providing information to tri-county residents about environmental issues and opportunities for involvement, it would be advantageous to use various forms of media, especially television news, and local and regional newspapers. Human interest stories, featuring stories about personal impacts on the environment, and the impact of water quality on residents of the tri-county area, could be especially effective.
- Given that a majority of tri-county residents use the Internet to obtain local and regional information and news, Carolina Clear and other organizations could take advantage of the unique capabilities of the Internet to allow for creative visual images about the environment. For example, photos of local landmarks and valued environmental assets could be featured. And, given that respondents are likely to become involved if they are personally impacted, stories featuring residents stories' about these personal impacts could be effective.

Targeting Specific Subgroups

The crosstabulation analyses reveal some important subgroup differences for many of the survey items. It is important to note that some of these differences may be a reflection of sociodemographic and other variables not measured in this study. For example, in some cases, race or education differences may be a reflection of socioeconomic status, rather than race or education, per se. Or, age differences may be a reflection of inability to become involved (e.g., in the case of elderly individuals), rather than the result of an unwillingness to become involved.

Nonetheless, the crosstabulation analyses do suggest that while there is a need to expand environmental awareness across all groups, survey results suggest that a more targeted education strategy may be appropriate for certain issues. That is, several response trends indicate a need for "segmented" outreach to specific sociodemographic groups.

- The findings on gender differences in environmental attitudes, knowledge and behaviors were mixed. For example, while men were more concerned than women about water quality, women were more likely than men to feel that pet waste was a source of bacteria pollution in local waterways. Women were more likely than men to conserve water, while men were more likely to be involved in clean-up events or to join or volunteer for an environmental organization. And, although women were more likely than men to clean up after their pets, women were more likely than men to participate in potentially negative household activities related to cars and disposing of chemicals, and yard waste. Thus, women could benefit from some targeted campaigns to improve knowledge about how certain household behaviors impact water quality. Some of these educational efforts could involve a partnership with local home and building supply stores that frequently target classes to women.
- The findings on race differences run counter to some research on race and environmentalism. Whites were more concerned than minorities about pollution and the environmental quality of local waterways and whites were more likely to indicate that people's actions impacted water quality a "great deal" or "somewhat." And, whites were more likely than minorities to choose the correct definition of the term "watershed." Despite these differences in environmental concern and knowledge, minorities were much more likely than whites to indicate that various activities had a "great" or "some" impact on water quality. Importantly, minorities also expressed a greater willingness to become involved in water quality issues for all five of the scenarios presented.
- As documented in the literature on environmental injustice, minorities and low-income populations often disproportionately bear the brunt of environmental degradation (Bullard, 2000). Efforts to promote watershed identity and environmental stewardship need to include the unique views of minority groups. Such strategies would require going beyond the traditional conservation efforts. Such endeavors could emphasize how minority citizens can contribute to efforts to improve water quality. Given the low level of awareness among residents of Carolina Clear, such efforts would need to raise the visibility of this organization and other organizations.
- Outreach efforts can also be segmented to individuals in different age groups. For example, although the youngest respondents (age 18-34) expressed the lowest level of concern about the environment and were least likely to feel individuals' actions impacted water quality, they were most likely to indicate they would get involved in water quality issues for two of the five scenarios presented. Individuals age 35-54 were most active in outdoor recreational activities. Thus, individuals of other age groups could be encouraged to become more involved in these activities in order to hopefully increase their sense of place attachment and sense of environmental stewardship.
- Since individuals age 65 and older were least likely to participate in outdoor recreational activities and were least likely to indicate they would become involved in efforts to improve water quality, environmental education efforts could focus on developing creative ways for nurturing an environmental ethic among members of this age group. For example, personal stories and memories about outdoor experiences and about local landmarks could be collected and shared with the community. By doing this, older residents could feel that their experiences are important for inspiring the involvement of other residents. Such stories could be shared through local media outlets and on the web pages of municipalities and local environmental organizations.

- Regarding home ownership status, renters expressed a higher level of concern about the environment than owners and were more likely than owners to rate various activities as having a "great" or "some" impact on water quality. And, they were much more likely to indicate they would become involved in water quality issues if they were directly affected by water quality. This suggests targeted efforts toward renters (e.g., apartment dwellers) would have some impact. For example, these residents could put pressure on landlords to offer opportunities for renters to engage in more environmentally-friendly behaviors (e.g., providing appropriate locations for washing cars or for disposing of yard waste). Given the fact that renters are concerned about water quality, those landlords who are more environmentally conscious could perhaps use "green marketing" to attract tenants.

Conclusion

The survey results provide a starting point for designing and implementing environmental education strategies for residents of Charleston, Berkeley and Dorchester counties. Environmental education has the potential to nurture residents' sense of place and place attachment and to broaden residents' perceptions about how they can make a difference in their local community. The residents of the tri-county area expressed a high level of concern about the quality of local waterways. An effective education effort can help to translate this concern into positive action on the part of residents. The survey results reported here can serve as a baseline for determining the ultimate success of such educational efforts.

References

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