Environmental Attitudes, Knowledge, and Behaviors of Residents of Horry and Georgetown Counties, S.C.

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Table of Contents

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 Horry and Georgetown counties in South Carolina.

The population of Horry and Georgetown counties 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 from late May to early July 2009. Data were collected from 398 residents from the following ten zip code areas in Horry and Georgetown counties:

29526	29566	29575	29577	29582
29527	29572	29576	29579	29585

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, the sample of respondents from Horry and Georgetown counties was disproportionately female (62.6% of the sample vs. 50.9% of the actual population in the ten zip code areas, as reported by the U.S. Bureau of the Census) and better educated than the general population (with 44.2% of the sample earning a bachelor's degree or higher vs. 21.9% of the general population). With respect to race, 91.2% of the sample was white as compared to 84.1% 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 (64.5% vs. 35.2%, respectively) and a lower proportion of 18-24 year olds (4.1% of the phone survey vs. 11.3% of the watershed population). Nearly 93% of respondents indicated they were homeowners (as compared to 72.9% of the general population) and a minority (45.9%) 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 residents of Horry and Georgetown counties. The summary below presents some of the main research findings.

- **Horry and Georgetown county residents are concerned about water quality in the region and place a high value on the water bodies in their area.** Slightly more than 45% of respondents are "very concerned" and 34.6% are "somewhat concerned" about pollution and the environmental quality of local streams and waterways. Respondents were also asked to choose the water resource in the region that they valued the most. Of the seven options listed, respondents were most likely to select the beaches as the water resource they valued most in the region (36.5%), followed by the Waccamaw River (26.8%), and the Intracoastal waterway (14.7%).

- **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, 53.4% of respondents indicated that what people do on the land affects the quality of their local streams and waterways "a great deal." Nearly 77% of respondents "strongly agreed" or "agreed" that inspection and pump out of septic tanks protects water quality; however, 14% indicated they did not know. Just over 85% of respondents indicated that they "strongly agreed" or "agreed" that pet waste is a source of bacteria pollution in local waterways. Regarding beliefs about the treatment of stormwater, nearly 88% 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. Of the items listed, respondents were most likely to indicate that the following sources of pollution had either a "great impact" or "some impact" on water quality: fertilizer and lawn chemicals that people use on their lawn and garden (86.4%), industrial sites (84.0%), fuel and oil leaks from trucks, buses or automobiles (78.7%), and farm operations (70.1%). On the other hand, respondents were most likely to say that the following sources of pollution had "very little impact" or "no impact" on water quality: runoff from people washing their cars (55.7%), pet waste (38.6%), and sediment or dirt from construction sites (30.7%).

- **The high level of concern about water quality is generally not matched by a high level of knowledge among residents about the basics of watersheds.** When asked to choose the correct definition of the term "watershed," just over one-fourth (25.6%) of respondents selected the correct answer ("area that drains into a specific river or lake"). The next most frequently selected answer was "reservoir that serves as a municipal water source" (21.9%), followed by a "low area that retains water" (18.2%). Approximately 15.7% of respondents indicated "do not know" when asked to choose the correct definition of the term "watershed."

- **For the most part, residents of Horry and Georgetown counties are involved in water and environmental conservation efforts.** Nearly 70% of respondents indicated they made an effort to reduce water usage out of concern for water quantity (i.e., drought) issues in the past two years. However, a smaller proportion (43.8%) reduced water usage out of concern for water quality. In general, residents are somewhat active in citizen-based environmental efforts: one-third of respondents indicated that they had participated in a lake or river cleanup and 15.7% had joined or volunteered for a conservation organization in the past two years.

- **There are some indications that the residents of Horry and Georgetown counties are engaging in environmentally-friendly household behaviors, although some residents are engaging in behaviors that could harm local rivers and streams.** Nearly all respondents indicated that, in the past two years, they "never" stored fertilizers and pesticides in leaking containers (99.8%), disposed of oil, paint, or other chemicals down storm drains (96.5%) or dumped grass clippings down storm drains or backyard creeks (92.8%). Nearly 2/3 of respondents (65.7%) of respondents indicated they "never" operated a motor vehicle with a leak. However, 61.0% of respondents indicated that they "never" washed their car on the lawn or gravel instead of pavement and nearly 30% of respondents indicated they "never" considered the likelihood of a rainstorm before treating their lawn with fertilizer or pesticides. Slightly more than one-fourth of respondents (25.7%) indicated they "never" cleaned up after their pets when taking them for a walk.

- **Horry and Georgetown 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, fishing, and hiking and walking in parks or other protected lands were the three most popular recreational activities for respondents (with 56.6%, 38.1%, and 33.7% of respondents indicating they participated in these activities "often," respectively). However, a majority (54.0%) of respondents indicated that they have "never" gone swimming in rivers or lakes, 79.2% of respondents indicated they have "never" kayaked or canoed and 71.1% indicated they had "never" gone hunting or trapping.

- **The high level of concern about water quality is generally matched by a high level of willingness to get involved in water resource issues.** Nearly 80% of respondents indicated they would "very likely" become involved if they were directly impacted by water quality. The media could play an influential role in promoting involvement in water improvement efforts: nearly 45% of respondents and 42% of respondents indicated they would "very likely" get involved if the media: ran stories on positive actions taken by local residents to improve water quality and if the media ran stories about local water pollution problems, respectively. And, 43.5% indicated they would "very likely" become involved if they knew the local government could save money in the long run by taking action to improve water quality. Nearly 30% of respondents indicated they would "very likely" become involved in water quality improvement efforts if they had more information about local water quality issues.

- **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. The most frequently selected source of information was the evening news, selected by 68.6% of respondents. The local newspaper and the television morning news were the next two most frequently cited sources of information, selected by 66.4% and 64.3% of respondents, respectively. Billboards and posters and events/workshops were the least frequently mentioned source of news: 9.0% and 2.3% of respondents indicated these sources as one of their three primary sources of news, respectively. In response to a separate question, 58.5% 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 82% of respondents indicated they had never heard of Carolina Clear. However, 11.3% indicated they had heard of Carolina Clear, but were not aware of its programs and 6.3% indicated they were aware of Carolina Clear and were familiar with its programs. Respondents were more familiar with the Coastal Waccamaw Stormwater Education Consortium: just over two-thirds (67%) of respondents indicated they had not heard of the consortium, while nearly 24% indicated they had heard of the consortium, but were not familiar with its programs. Nine percent of respondents indicated they were aware of the Consortium and familiar with its programs

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 Horry and Georgetown counties 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 Horry and Georgetown counties in South Carolina. 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 and the Coastal Waccamaw Storm Water Education Consortium.

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.

The population of Horry and Georgetown counties in South Carolina is such that a sample of 385-400 respondents would permit estimates of the survey results with a margin of error of ± 5% at a 95% confidence level. Data were collected from residents from the following ten zip code areas in Horry and Georgetown counties:

29526	29566	29575	29577	29582
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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 late May to early July 2009. A total of 398 residents of Horry and Georgetown counties were surveyed, for a margin of error of plus or minus 5%, with a 95% confidence level.

Nearly 37,000 phone calls were made to complete the survey. The completed response rate for the survey was 7.6%. 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 survey of residents of Horry and Georgetown counties. 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, 18.3% 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 ten zip code areas surveyed). The cooperation rate for this survey of residents of Horry County and Georgetown County was 11.6%.

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 Horry and Georgetown counties as reflected in Census 2000 data, the survey sample was disproportionately female (62.6% of the sample vs. 50.9% of the actual population in the ten zip code areas, as reported by the U.S. Bureau of the Census) and better educated than the general population (with 44.2% of the sample earning a bachelor's degree or higher vs. 21.9% of the general population). With respect to race, 91.2% of the sample was white as compared to 84.1% 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 (64.5% vs. 35.2%, respectively) and a lower proportion of 18-24 year olds (4.1% of the phone survey vs. 11.3% of the general population). Nearly 93% of respondents indicated they were homeowners (as compared to 72.9% of the general population).

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 Horry and Georgetown counties 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 Horry and Georgetown counties 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 this survey sample 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?" Nearly 46% of respondents indicated they lived next to a creek, stream, river, pond or other water body (Table D-1). The following groups of individuals were most likely to indicate they lived near a waterbody: whites were more likely than minorities (Cramer's V = .241; Table F-1), the most highly educated were more likely than those with a high school degree or less or those with some college or a two-year degree (Cramer's V = .160; Table G-1); individuals age 35-54 years old as compared to individuals of other ages (Cramer's V = .157; Table H-1), and owners were more likely than renters (Cramer's V =.168; Table I-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). Eighty percent 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. While there were no sex differences in levels of concern, whites expressed more concern than minorities about environmental quality (Cramer's V = .116; Table F-2). There were no educational differences in levels of concern; individuals across all educational levels were equally concerned about the environment. In terms of age differences, individuals age 35-54 were the most concerned while individuals 65 years of age and older, were the least concerned about the environment (gamma = .162; Table H-2). Renters were more likely than home owners to indicate they were "very" or "somewhat" concerned about the environment (93.0% vs. 75.1%, respectively) (Cramer's V = .188; Table I-2).

Respondents were asked to indicate to what extent they thought people's actions affected water quality. Slightly more than 53% of respondents indicated that people's actions had a "great deal" of impact on water quality (Table D-3). While there were no differences by race and education, there were sex, age and homeownership status differences in perceptions of whether people's actions affect the environment. Males (90.8%) were more likely than females (82.8%) to indicate that people's actions affected water quality a "great deal" or "somewhat" (Cramer's V= .120) (Table E-3). There was a negative relationship between age and likelihood of indicating that people's actions affected waterways "a great deal" or "somewhat" and this relationship was quite strong (gamma = .361; Table H-3). The younger the individual, the more likely they were to believe that people's actions affected water quality "a great deal" or "somewhat." Renters (98.9%) were much more likely than home owners (85.1%) to believe this was the case (Cramer's V = .180; Table I-3).

Concern about the environment is often measured by asking residents to what extent they value certain environmental assets and resources in the community. When asked what local water resource they valued the most, the respondents from Horry and Georgetown counties were most likely to select "the beaches" (selected by 36.5% of respondents) (Table D-23). The second most valued water resource was the Waccamaw River, selected by 26.8% of respondents), with the Intracoastal waterway as third most valued resource (selected by 14.7% or respondents). The open-ended responses to this question, listed in Table J-9, reveal a broad array of valued water resources, ranging from Lake Moultrie, to Winyah Bay, to the Atlantic Ocean itself. A number of respondents indicated that all of the water resources were equally important (e.g., "I care about them all equally" and "Can't choose just one, all important.")

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.

An overwhelming majority of respondents indicated that allowing natural vegetation to grow wild and planting bushes and shrubs were "very" or "somewhat" effective practices for managing land along a river or lake in an environmentally-friendly way (91.9% and 91.4%, respectively) (Table D-8). Slightly more than 79% recognized installing a retaining wall or bulkhead as a "very" or "somewhat" effective practice. Respondents were least likely to indicate that keeping vegetation mowed to the edge of the water was a "very" or "somewhat" effective way to manage land along a river or lake, although 61.0% indicated this was the case.

As indicated by the number of responses for each of these questions, the number of missing values for these questions was quite high for two of the survey items. The percentage of respondents indicating they did not know about the effectiveness of these various measures (or, that did not respond to the question) was quite high for these two measures: 13.8% for keeping vegetation mowed and 14.8% for installing a retaining wall or bulkhead.

Regarding subgroup differences, there were statistically significant differences by sex for allowing natural vegetation to grow wild (Cramer's V = .186; Table E-15), with a higher proportion of males (74.8%) than females (57.8%) ranking this practice as "very effective" for maintaining land along a waterway. There were racial differences for two of the four questions in this section of the survey. Whites (69.9%) were more likely than minorities (53.9%) to rank allowing natural vegetation to grow wild (Cramer's V = .203; Table F-15) and installing a retaining wall or bulkhead (Cramer's V = .315; Table F-18) as "very effective" for managing land along water bodies.

In terms of education, statistically significant differences were noted for three of the four items. Individuals at the lowest educational attainment level were more likely than individuals with higher educational attainment levels to indicate that keeping grass mowed to the edge of the water, planting bushes and shrubs, and installing a retaining wall or bulkhead were "very effective" land management practices (Tables G-16, G-17 and G-18, respectively). The relationship was quite strong for the latter two items (gamma = .132 and gamma = .207, respectively), although the relationship was weak for the first item (keeping grass mowed to the edge), as indicated by the low and non-significant gamma value of .042 for this item.

Age differences were observed for two items: keeping grass and other vegetation mowed to the edge (gamma = -.160; Table H-16) and installing a retaining wall or bulkhead (gamma = .078; Table H-18). Nearly one-half (49.7%) of 18-34 year olds indicated that keeping grass mowed to the edge of the water was "not at all effective," as compared to slightly more than one-fourth of individuals 65 years and older (gamma = .160; Table H-16). And, twice the proportion (33.3%) of 65 year olds versus individuals age 18-34 (16.1%) indicated that installing a retaining wall or bulkhead was "not at all effective" (Table H-18). However, the relationship was rather weak for this item as indicated by the low gamma value of .078.

There was a statistically significant relationship between home ownership status and ranking of three of the four items related to land management practices. Renters were more likely than owners to indicate that allowing natural vegetation to grow wild and planting bushes and shrubs was a "very effective" strategy for managing land along a river or lake in an environmentally-friendly way (Tables I-15 and I-17, respectively). This relationship was quite strong for both

items, with a Cramer's V value of .207 for the "natural vegetation" measure and .291 for "planting bushes and shrubs." This relationship between homeownership status and ranking of these items was even stronger for the third item: keeping grass and other vegetation mowed to the edge of the water. For this item, owners were more likely than renters to indicate that this was a "very effective" practice for managing land along a river or lake (Cramer's V = .312; Table I-16).

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?" More than 100 open-ended responses were provided for this question (see Table J-1 for a list of some of these suggestions). Many of these responses were related to litter control (e.g., "fine people who throw their trash" in local water bodies and getting "volunteers to pick up trash"). Other respondents described using more "natural" strategies (e.g., "Leave things alone. Things eventually deteriorate no matter what we do." And "Make it as natural as possible, with as little interference from humans as possible."). Concerns about construction (e.g., "don't allow construction in flood areas") and the need for more environmental education (e.g., "educate the people who live along the banks of rivers and lakes") were also evident in these open-ended responses

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 77% of respondents indicated they "strongly agreed" or "agreed" that inspection and pump out of septic tanks protects water quality (Table D-4). However, 14% of respondents indicated "do not know" for this question. And, while there were no statistically significant education, age, or homeownership differences for this question, there were sex and race differences. Females were more likely than males (Cramer's V = .174; Table E-4) and minorities were more likely than whites (Cramer's V = .150; Table F-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?"

Nearly 88% of respondents believed that this water is not treated, while only 6.1% indicated that "yes, it is treated." Six percent of respondents indicated "do not know" for this survey item (Table D-6).

With the exception of homeownership status, there were no subgroup differences for this item. Regarding homeownership status, homeowners were more likely than renters to indicate that they believed that stormwater is treated (7.6% vs. 1.0%, respectively) (Cramer's V = .120; 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 residents of Horry and Georgetown counties with residents from other areas.

When asked to choose the correct definition of the term "watershed," slightly more than one-fourth (25.6%) of respondents selected the correct answer ("area that drains into specific river or lake") and nearly 16% indicated they did not know the correct definition (Table D-9). Nearly 22% of respondents selected "a reservoir that serves as a municipal water source," 18.2% selected "an area that retains water like a swamp or marsh," and another 16.9% selected "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 residents of the two counties surveyed.

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., "an area where water drains in, is filtered and then drains out" and "place where water drains off to and is filtered, then runs off into a natural formation"), and others that are not at all related to the actual definition (e.g., "where water is stored").

Regarding subgroup differences in this basic knowledge about watersheds, males and females were equally likely to choose the correct definition, however a greater proportion of females (20.3%) than males (12.0%) indicated they did not know the correct definition (Cramer's V=.295; Table E-19). Also, females (29.9%) were nearly twice as likely as males (15.3%) to select "reservoir that serves as a municipal water source." Males were nearly three times more likely than females to choose "an area that retains water, like a swamp or marsh" as the correct definition.

There were no statistically significant differences for this survey item for race, education, age, and homeownership status.

Beliefs about Sources of Water Pollution

To gauge respondents' knowledge about water pollution, respondents were asked to assess the extent to which the following eight 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; 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

Fuel and oil leaks were identified as having the greatest impact on water quality with 55% of respondents indicated that this activity had a "great" impact on water quality (Table D-7). 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: industrial sites (53.3%), fertilizers and lawn chemicals that people use on their lawn and garden (49.1%), and farm operations (38.6%). A relatively small proportion of respondents indicated that runoff from people washing their cars (10.6%) had a "great impact" on the water quality of local streams and lakes.

There were some important subgroup differences in the assessment of the impact of the eight sources of water pollution. Females were more likely than males to indicate that six of the eight practices had a "great" or "some" impact on water quality: fertilizers and lawn chemicals (Cramer's V = .225; Table E-7), fuel and oil leaks from motorized vehicles (Cramer's V = .152; Table E-8), pet waste (Cramer's V = .298; Table E-9), runoff from people washing their cars (Cramer's V = .351; Table E-11), sediment or dirt from construction sites (Cramer's V = .121; Table E-13), and parking lot runoff (Cramer's V = .170; Table E-14).

Regarding the statistically significant racial differences, for three survey items, whites were more likely than minorities to indicate that the three sources of pollution had a "great" impact on water quality of local waterways: fuel and leaks from trucks, buses or automobiles (Cramer's V = .115; Table F-8), industrial sites (Cramer's V = .100; Table F-11), and parking lot runoff (Cramer's V = .132; Table F-14). Minorities were more likely than whites to indicate that sediment or dirt from construction sites had "a great" or "some" impact on water quality (Cramer's V = .253; Table F-13).

Regarding education differences, individuals with the lowest levels of educational attainment (high school degree or less) were the least likely to indicate that runoff from people washing their cars had a "great" or "some" impact on local streams or lakes (gamma = -.229; Table G-10). On the other hand, individuals with a high school degree or less were far more likely than the other respondents to indicate that industrial sites had a "great" or "some" impact on local streams or lakes (gamma = .465; Table G-11).

Individuals with a mid-level of educational attainment (some college or a two-year degree) were more likely than other respondents to indicate that pet waste (gamma = -.215; Table G-9) had a "great" or "some" impact on local water bodies and that farm operations (gamma = .242; Table G-12) had "very little" or "no" impact on local streams and lakes. And, individuals with the highest educational attainment levels (bachelors degree or higher) were most likely to indicate that sediment or dirt from construction sites had "very little" to "no" impact on local streams or lakes (Table G-13), although the relationship was very weak (gamma = .010).

There were statistically significant differences between age groups in the assessment of the impact of four of the eight sources of pollution. For all four of these items, individuals age 35-54 were most likely to indicate the following sources of pollution had a "great" or "some" impact on local streams and lakes: runoff from people washing their cars (gamma = -.141; Table H-10), industrial sites (gamma = -.038; Table H-11), farm operations (gamma = -.215; Table H-12), and parking lot runoff (gamma = .037; Table H-14). Note that the relationship between age and these impact assessments was weak for two of these items, as measured by the low gamma values: industrial sites and parking lot runoff.

Renters and owners differed significantly in their assessment of the impact of five of the eight sources of pollution. Renters were more likely than owners to indicate that four of these items (fertilizers/chemicals, industrial sites, farm operations, and sediment or dirt from construction sites) had a "great" or "some" impact on water quality. The relationship between homeownership status and assessment of the impact of these sources was moderately strong, with Cramer's V's ranging from .105 (for runoff from people washing their cars) to .181 (for sediment or dirt from construction sites). Owners were more likely than renters to rate runoff from people washing their cars as having a "great" or "some" impact on the environment (gamma = .105; Table I-10).

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 3/4 of respondents (75.4%) indicated they "strongly agreed" or "agreed" with this statement (Table D-5). Nearly six percent (5.6%) 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 = .204; Table E-5), minorities were more likely than whites (Cramer's V = .152; Table F-5), and renters were more likely than owners (Cramer's V = .195; 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 Activities

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 local 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 74.6%, 53.1%, and 52.4% of respondents indicating they participated in these activities "often" or "sometimes", respectively). The lowest participation rates were recorded for hunting/trapping and kayaking/canoeing (with 92.0% and 75.4% of respondents indicating they participated in these activities "rarely" or "never", respectively).

The results indicate a number of subgroup differences in levels of participation in the various recreational activities. For three activities, men were more likely than women to indicate they "often" or "sometimes" participated in the activity: fishing (Cramer's V = .273; Table E-21), motorboating (Cramer's V = .094; Table E-23), and hunting/trapping (Cramer's V = 316; Table E-26). Women were more likely than men to indicate they "often" or "sometimes" hiked or walked in parks or other protected areas (Cramer's V = .100; Table E-25). Men and women were equally likely to participate (or, not participate) in kayaking/canoeing, swimming, and visiting the beach.

There were statistically significant race differences for six of the seven activities (see Table F-21 through Table F-26). Whites were more likely than minorities to participate "often" or "sometimes" in all six of these activities: fishing, swimming, motorboating, visiting the beach, hiking/walking, and hunting/trapping. The relationships between race and participation in recreational activities were moderately strong, with Cramer's V values ranging from .118 (for fishing) to .286 (for swimming). White and minorities were equally likely to participate (or, to not participate) in kayaking or canoeing.

Educational differences were observed for five of the seven items. Fishing, swimming, and hunting/trapping were especially important activities for individuals with a high school degree or less (Tables G-21, G-22, and G-26, respectively). And, the relationships were very strong, with gamma values ranging from .308 (for swimming) to .620 (for hunting/trapping). There was also a very strong relationship between education and participation in kayaking/canoeing: individuals at the highest level of educational attainment were far more likely than other respondents to indicate they "often" or "sometimes" participated in this activity (gamma = -.509; Table G-20). Individuals at this level of educational attainment were also more likely to visit the beach, although the relationship was weak (gamma = .042; Table G-24).

As indicated in Tables H-21 through H-26, the relationships between age and recreational participation were statistically significant for six of the seven activities (all of the activities except for kayaking and canoeing). For all six of these activities, the youngest respondents (age 18-34) were most likely to indicate they "often" or "sometimes" participated in these activities, while individuals age 65 and older were least likely to participate (with the exception of "visiting the beach"; individuals age 55-64 years of age were least likely to participate in this activity). The relationships between age and recreational participation were very strong, with gamma values ranging from .283 (for motorboating) to .744 (for hunting/trapping).

Renters were more likely than owners to indicate they "often" or "sometimes" participated in four of the seven activities: fishing (Cramer's V = .264; Table I-21), swimming (Cramer's V = .123; Table I-22), visiting the beach (Cramer's V = .197; Table I-24), and hiking (Cramer's V = .103; Table I-25). Owners were more likely than renters to indicate they "often" or "sometimes" used a motorboat (Cramer's V = .193; Table I-23).

Participation in More General Positive Behaviors

A major goal of many environmental education efforts is to promote environmentally-friendly behaviors among residents. 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 residents of Horry and Georgetown counties 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 (69.5% of respondents indicating "yes" to this question), followed by reducing water usage out of concern for water quality (43.8%), participating in a clean-up event (33.3%) and joining or volunteering for a conservation/environmental organization (15.7%). Regarding the latter item, Table J-4 indicates that respondents are involved in a broad variety of local organizations (Myrtle Beach Made Better and the Coastal Conservation League) and national organizations (National Wild Turkey Federation, Greenpeace, the Audubon Society, and the Arbor Day Foundation).

Regarding sex differences for these activities, males were more likely than females to participate in clean-up events , although the relationship between sex and this activity was weak (Cramer's V = .095; Table E-29). Otherwise, males and females were equally likely to participate (or, to not participate) in the other three activities in the previous two years.

Whites were more likely than minorities to indicate they had reduced water usage out of concern for drought conditions (Cramer's V = .167; Table F-27). Otherwise, whites and minorities were equally likely to indicate they had, or had not, reduced water usage out of concern for water quality, participated in clean-up activities or joined an environmental organization in the past two years.

Statistically significant educational differences in participation were observed for three of the four activities. Individuals with some college or a two-year degree were most likely to indicate they had reduced water usage out of concern for drought conditions, while individuals with a high school degree or less were least likely to do so (Cramer's V = .192; Table G-27). Individuals with the lowest level of education were most likely to indicate they had not participated in a clean-up event in the previous two years (Cramer's V = .186; Table G-29). Twice as many individuals at the highest educational attainment level as individuals with a high school education or less indicated they had joined an environmental organization in the previous two years (Cramer's V = .141; Table G-30).

Participation in positive behaviors varied by age for all four activities. Individuals age 35-54 were most likely to indicate they had participated in all four of these activities. Individuals age 35-54 were most likely to reduce water usage out of concern for water quantity (Cramer's V = .245; Table H-27) or water quality (Cramer's V = .138; Table H-28). Individuals in the youngest age group (18-34) were most likely to say they did not reduce their water usage for either of these reasons. Individuals age 65 and older were more likely than individuals from the other age groups to indicate they had not participated in a clean-up event (Cramer's V = .147; Table H-29). Regarding joining or volunteering for an environmental organization, individuals age 35-54 were most likely to do so (Cramer's V = .174; Table H-30).

Regarding home ownership status, renters were much more likely than owners to reduce water usage out of concern for drought (Cramer's V = .172; Table I-27) or for the quality of water in local streams and lakes (Cramer's V = .243; Table I-28). Otherwise, there were no differences between renters and owners in their likelihood of participating in clean-up events or joining or volunteering for a conservation organization.

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, residents were participating in positive environmental behaviors and refraining from participating in negative household behaviors (Table D-15). Nearly 63% of respondents indicated they "always" or "nearly always" considered the likelihood of rain before treating their lawns with fertilizers or pesticides. Slightly more than 71% 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 vehicle with an oil leak (65.7%), dumping grass clippings down storm drains or backyard creeks (92.8%), disposing of oil, paint, or other chemicals down storm drains (96.5%), and storing fertilizers and pesticides in leaking containers (99.8%). It is noted, however, that only 21.0% of respondents said 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 two of the seven behaviors. Males were more likely than females to indicate they "always" or "nearly always" considered the likelihood of rain before using fertilizers or pesticides (Cramer's V = .166; Table E-33), a positive behavior. On the other hand, males were more likely than females to indicate they "always" or "nearly always" operated a vehicle with a motor oil leak (Cramer's V = .159; Table E-35), a potentially negative behavior.

Statistically significant racial differences were observed for just one of the seven items: whites were more likely than minorities to indicate they "always" or "nearly always" operated vehicle with a motor oil leak (Cramer's V = .186; Table F-35). Otherwise, whites and minorities were equally likely to participate (or, not participate) in the remaining six activities.

Regarding educational differences, individuals with some college or a two-year degree were much more likely than individuals with a lower or higher education level to indicate they "hardly ever" or "never" considered the likelihood of a rainstorm before treating the lawn with fertilizer or pesticide (gamma = .066; Table G-33), although the relationship was weak (as measured by the low gamma value). Individuals with the mid-level of educational attainment were much more likely to indicate they "always" or "nearly always" picked up after their pet, while those individuals with the lowest educational attainment were most likely to indicate they "hardly ever" or "never" did so (gamma = -.422; Table G-34). 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 .677 (Table G-35).

One item resulted in statistically significant age differences in household behaviors: individuals age 18-34 were far more likely than individuals from other age groups to indicate they "always" or "nearly always" operated a vehicle with an oil leak and this relationship was very strong, with nearly 1/3 of 18-34 year olds indicating they did so, as compared to between 0% and 2.5% of the other age groups (gamma = .913; Table H-35).

Both renters and owners were quite likely to clean up after their pets, but renters were more likely than owners to do so (Cramer's V = .341, Table I-34), with 100% of renters indicating they did so (as compared to nearly 2/3 of owners). However, renters were more likely than owners to say they "always" or "nearly always" operated a vehicle with an oil leak (Cramer's V = .337; Table I-35). Owners were more likely than renters to indicate they "always" or "nearly always" washed their car on the lawn or gravel instead of pavement (Cramer's V = .162; Table I-37).

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 72% of respondents indicated that they, or another household member, were responsible for mowing the

lawn (Table D-12). However, nearly 37% of respondents indicated that the task of fertilizing the lawn was handled "in-house"; for nearly 18% of respondents, this task was handled by someone outside the household (Table D-13). Importantly, 45% of respondents indicated that they did not use fertilizers.

Males were more likely than females (Cramer's V = .161; Table E-31) and whites were more likely than minorities (Cramer's V = .239; Table F-31) to indicate that they or someone in the household were responsible for mowing the lawn. Individuals age 65 and older were most likely to say that someone from outside the household was responsible for mowing the lawn (Cramer's V = .151; Table H-31).

Owners were far more likely than renters to be responsible for mowing their lawn (Cramer's V = .314; Table I-31) or fertilizing their lawn (Cramer's V = .288; Table I-32), rather than having someone from outside the household do either of these tasks.

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 18.9% of respondents) was "reading the product information and instructions on the bag or container." Much smaller proportions indicated they used other methods (8.0%) or indicated the lawn company took care of fertilizing the lawn or applying pesticides (6.6%).

Regarding the disposal of household chemicals such as paint or paint thinners, cleaners or pesticides, slightly more than one-half of the respondents indicated they took them to the landfill on appointed days (52.6% of respondents) or disposed in them in other ways (17.6%). (See Table D-17). Table J-5 provides insights into additional ways that respondents disposed of these products.

For those respondents with a septic tank, slightly more than 36% indicated they had never had their septic tanks inspected or pumped out in the previous five years. Slightly more than 26% indicated they had had their septic tank inspected or pumped out once in the previous five years, while another 15.4% indicated they had the septic tank pumped out or inspected four or more times in the same time period; 6.4% indicated they did not know if they had the septic tank inspected or pumped out in the previous five years (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 (68.6%), local newspapers (66.4%), and TV morning news (64.3%). Nearly equal proportions of respondents selected regional newspapers (16.9%) and public radio (16.0%) as one of their top three sources of local and regional information and news. Billboards and posters and events/workshops were the least likely to be selected as a source of information and news (selected by 9.0% and 2.3% 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-8 indicates that respondents obtain regional and local news and information through several methods, including specific Internet-based sources (discussion groups and Yahoo), friends and neighbors in government agencies, work colleagues, and family members.

A majority (58.5%) of respondents indicated they used the Internet to get their local and regional and news (Table D-22). Obtaining local or regional information through the Internet was related to education and age: the more education one has, the more likely they are to use the Internet (Cramer's V = .212; Table G-47), with 75% of those with the most education versus 49.1% of individuals with a high school degree or less saying they used the Internet. Age was positively related to using the Internet to obtain information: the youngest respondents (18-34 years old) were more likely than other respondents to use the Internet to get local and regional news (Cramer's V = .283; Table H-47). More than twice as many of 18-34 year olds (67.7%) as those 65 years of age and older (30.9%) used the Internet for local and regional information and news.

Awareness of Environmental Organizations

Respondents were asked to what extent they were familiar with Carolina Clear and the Coastal Waccamaw Stormwater Education Consortium. Overall, there is a somewhat low level of awareness of these two organizations. Nearly 18% 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). However, one-third of respondents (33.0%) indicated a similar level of familiarity with the Coastal Waccamaw Stormwater Education Consortium (Table D-20). Slightly more than 82% of respondents had never heard of Carolina Clear, while slightly more than 2/3 (67%) of respondents indicated they had never heard of the Coastal Waccamaw Stormwater Education Consortium.

For those respondents who had heard of either agency, Table J-6 and Table J-7 reveal that respondent 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 newspaper was an especially influential source of information about the Coastal Waccamaw Stormwater Education Consortium, with some respondents mentioning specific regional newspapers (e.g., the Coastal Observer and the Waccamaw Times).

The data reveal gender and homeownership differences in whether individuals were familiar with Carolina Clear. Females (14.2%) were more likely than males (8.8%) to have a mid-range level of awareness of this organization (i.e., they had heard of Coastal Carolina, but were not familiar with the agency's programs) and males (9.6%) indicated a higher level of familiarity than females (2.5%) of familiarity with Carolina Clear (i.e., males were aware of Carolina Clear and familiar with its programs) (Cramer's V = .161; Table E-45).

Renters (92.8%) were more likely than owners (79.8%) to indicate they had not heard of Carolina Clear (Cramer's V = .160; Table I-45. In fact, no renters said they were both aware of Carolina Clear and familiar with its programs.

There were gender, race, education and homeownership differences in level of familiarity with the Coastal Waccamaw Stormwater Education Consortium. Females (12.2%) were more likely than males (6.2%) to be familiar with this organization and its programs, while males (32.2%) were more likely than females (14.2%) to indicate they had a mid-range level of familiarity with this organization (Cramer's V = .220; Table E-46). While whites and minorities were equally likely to be familiar with the organization and its programs, minorities were far more likely to indicate a mid-range level of familiarity with the Coastal Waccamaw Stormwater Education Consortium. Nearly twice as many whites (73.3%) as minorities (36.8%) indicated they had not heard of the organization (Cramer's V = .325; Table F-46).

In terms of education, individuals with some college or a two-year degree were most likely to say they had never heard of the organization and its programs while individuals with a high school degree or less were most likely to indicate a mid-level range of familiarity with the organization (Cramer's V = .110; Table G-46). While renters and owners were equally likely to indicate they were aware of the Coastal Waccamaw Stormwater Education Consortium and were familiar with its programs, renters (52.0%) were far more likely than owners (16.7%) to indicate a mid-range level of familiarity; owners (73.0%) were far more likely than renters (40.0%) to indicate they had not heard of the agency (Cramer's V = .349; Table I-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 residents of Horry and Georgetown counties about 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 80 percent for each of the five scenarios (Table D-18). Respondents would be most likely to get involved if they were personally affected, with 91.7% of respondents indicating they would "very likely" or "somewhat likely" become involved if they were being directly impacted by water pollution. For the remaining four items, the percentage of respondents indicating they'd "very likely" or "somewhat likely" get involved ranged from 80.2% (for having more information about water quality issues in your area") to 82.6% (for "the local media ran stories on positive actions taken by local residents to improve water quality.

Concerning demographic differences in likelihood of getting involved, there were no sex differences in likelihood of involvement. For all five items, males and females were equally likely to indicate they would become involved in water resource issues. However, there were race differences for all five of the items (See Tables F-40 through F-44). For all five items, minorities were much more likely than whites to indicate that they would be "very likely" or "somewhat likely" get involved in water resource issues. The relationships between race and likelihood of involvement were moderately strong with Cramer's V values ranging from .115 (if they were being directly impacted by water pollution) to .189 (if the local government could save money in the long run by taking action to improve water quality).

Educational attainment was not significantly related to the likelihood of becoming involved in water resource issues. Individuals of all three educational attainment groupings were equally likely to become involved in efforts to improve water quality. However, there were age differences for four of the five items. For these four items, individuals in the youngest age group (18-34) were more likely than older individuals to say that they would "very likely" or "somewhat likely" become involved in water resource issues. The relationships between age and likelihood of involvement were very strong, with gamma values ranging from .355 (for if the local government could save money in the long run) to .666 (if the local media featured stories on local water pollution problems).

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-40 through I-44). The relationship between homeownership status and likelihood of involvement was moderately strong to strong, with Cramer's V's ranging from .131 (for becoming involved if they were directly affected) to .240 (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 the residents of Horry and Georgetown counties 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 region of Horry and Georgetown counties 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 general public and residents value water resources very highly. 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 the residents of Horry and Georgetown counties was high and comparable to levels of concern in other watersheds, knowledge about watershed basics was quite low. The ability of 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 residents would benefit from more information about the impact on water quality of pet waste and runoff from people washing their cars.

- An encouraging sign is the fact that residents of Horry and Georgetown counties 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 33% of respondents indicated they would "very likely" become involved if they knew the government could save money, but a much greater proportion of respondents (79.9%) 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 residents of Horry and Georgetown counties about environmental issues and opportunities for involvement, it would be advantageous to use various forms of media, especially television morning and evening news and local newspapers. Human interest stories, featuring stories about personal impacts on the environment, and the impact of water quality on residents of Horry and Georgetown counties could be especially effective.
- Given that a majority of respondents indicated they 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 were mixed and some of these findings run counter to the research on gender differences in environmentalism. In terms of gender, men and women were equally concerned about pollution and water quality. However, women were more likely than men to feel that various sources of pollution had a "great" impact on water quality. Men and women were equally likely to indicate they would (or, would not) be willing to become involved in water quality issues.
- The data suggested some important racial differences in some of the key research variables. Whites were more likely than minorities to be concerned about the environment and to indicate that the various sources of pollution had a "great" impact on water quality. Despite these differences in concern and assessment of impact, however, minorities expressed a greater willingness to become involved in water quality issues for all five of the scenarios presented. This level of concern and willingness to get involved was higher than whites, despite minorities having lower rates of participation than whites in outdoor activities.
- 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, the oldest respondents (age 65 and older) were least concerned about pollution and water quality. The youngest respondents (age 18-34) were least likely to indicate they had participated in several positive behaviors, including engaging in water conservation efforts. This was despite the fact that they were the most highly engaged in recreational activities and were most likely to indicate they would get involved in water quality issues for all five scenarios presented. Individuals age 35-54 were most likely to indicate they had participated in some positive environmental behaviors.
- 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, owners expressed a higher level of concern about the environment than renters and were more likely than renters to indicate that people's actions impacted water quality. However, renters were more likely than owners to rate various activities as having a "great" or "some" impact on water quality. And, renters were much more likely to indicate they would become involved in water quality issues for all five of the scenarios presented. 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). 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. . And, renters' greater propensity than owners to participate in outdoor recreational activities could be an important starting point for environmentally education efforts that are segmented by home ownership status.

Conclusion

The survey results provide a starting point for designing and implementing environmental education strategies for the residents of Horry and Georgetown 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. Residents 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.

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