Environmental Attitudes, Knowledge, and Behaviors of Residents of the Pee Dee Region, 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 the Pee Dee region of South Carolina.

The population of the Pee Dee region is such that in this region 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 during the month of August 2009. Data were collected from 399 residents from the following seven zip code areas in the region:

29161	29505	29530	29541
29501	29506	29532	

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 Pee Dee region survey sample was disproportionately female (64.2% of the sample vs. 52.9% of the actual population in the seven zip code areas, as reported by the U.S. Bureau of the Census) and better educated than the general population (with 45.7% of the sample earning a bachelor's degree or higher vs. 19.3% of the general population). With respect to race, 74.5% of the sample was white, as compared to 58.7% 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 (48.5% vs. 28.2%, respectively) and a lower proportion of 18-24 year olds (4.3% of the phone survey vs. 12.9% of the general population). Approximately 85.6% of respondents indicated they were homeowners (as compared to nearly 3/4 (74.6%) of the general population) and 31% indicated they lived next to a creek, stream, river, lake or pond.

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 the Pee Dee region. The summary below presents some of the main research findings.

- **Residents of the Pee Dee region are concerned about water quality in the region and place a high value on the water bodies in their area.** Slightly more than 46% of respondents are "very concerned" and 35.2% are "somewhat concerned" about pollution and the environmental quality of local streams and waterways. Slightly more than 94% of respondents indicated that they feel that water resources are "very important" to the livelihood and quality of life in the Pee Dee region.

- **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, nearly ½ of respondents (49.3%) indicated that what people do on the land affects the quality of their local streams and waterways "a great deal." However, 8.4% indicated they did not know. Approximately 73.6% of respondents "strongly agreed" or "agreed" that inspection and pump out of septic tanks protects water quality, although 15.6% indicated they did not know. And, 68.4% strongly agreed" or "agreed" that pet waste is a source of bacteria pollution in local waterways; however, 11.5% indicated they did not know that pet waste was a source of bacteria pollution. Regarding beliefs about the stormwater treatment, just over 63.8% of respondents did not believe that stormwater was treated before reaching lakes, rivers and streams; 11.8% indicated they did not know.

  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 (91.1%), fuel and oil leaks from trucks, buses or automobiles (81.3%), fertilizer and lawn chemicals that people use on their lawns and gardens (78.0%), and farm operations (71.1%). 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: runoff from people washing their cars (48.4%); waste from birds (47%); pet waste (44.9%) and parking lot runoff (36.5%).

- **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 of respondents (25.2%) selected the correct answer ("area that drains into specific river or lake"). A nearly equal proportion (23.7%) selected "reservoir that serves as a municipal water source" as the correct answer. Importantly, nearly 17% of respondents indicated "do not know" when asked to choose the correct definition of the term "watershed."

  Residents of the Pee Dee region were also asked if they could identify the specific body of water that directly absorbs the runoff from rain that falls where they live. Over half of the respondents (53.9%) indicated they did not know the name of this body of water. However, slightly more than 46% of respondents indicated either that they "certainly" could name the body of water (21.2%) or that they thought they knew the name of the water body (25.0%).

- **For the most part, Pee Dee residents are involved in water and environmental conservation efforts.** Slightly more than 73% 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 (45.1%) revealed that, in the past two years, they had reduced water usage out of concern for water quality. In general, Pee Dee residents are somewhat active in citizen-based efforts: 20.8% of respondents indicated they had participated in a lake or river cleanup; however, only 9% had joined or volunteered for a conservation organization in the past two years.

- **There are some indications that Pee Dee residents are engaging in environmentally-friendly household behaviors, although some residents are engaging in behaviors that could harm local rivers and streams.** A large proportion of respondents indicated that, in the past two years, they "never" did the following: dumped grass clippings down storm drains or backyard creeks (98%); stored fertilizers or pesticides in leaky containers (97.5%) or disposed of oil, paint, or other chemicals down storm drains (97.3%). Nearly 81% of respondents indicated they "never" operated a motor vehicle with a leak. However, a majority of respondents (55%) indicated they "never" washed their car on the lawn or gravel instead of pavement and nearly 38% of respondents indicated they "never" cleaned up after their pets when taking them for a walk.

- **Pee Dee residents are somewhat active in outdoor recreational behaviors, but there is a mixed picture in regard to water-based recreational activities.** Hiking, fishing and visiting the beach were the three most popular recreational activities for respondents (with 23.8%, 17.8%, and 16.4% of respondents indicating they participated in these activities "often," respectively). However, just over 82% of respondents indicated they "never" kayaked or canoed, 67.4% have "never" gone motorboating, 64.2% had "never" gone swimming in rivers or lakes, and 78.7% indicated they "never" hunted or trapped.

- **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 85% of respondents indicated they would "very likely" become involved in water resource issues if they were directly impacted by water quality. For the remaining survey items in this section of the survey, nearly or just over half of the respondents indicated they would be "very likely" to become involved in water resource issues (if they knew the local government could save money (53.5%); if they had more information about local water quality issues (48.8%); and if the local media ran positive stories about actions taken by local residents to improve water quality (49.2%) and stories about water pollution problems (46.7%)).

- **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. Nearly 79% of respondents indicated that they received their news through television evening news broadcasts. Slightly more than 57% of respondents indicated they listened to the morning news. Local newspapers were also an important source of information: 35.7% indicated this as one of their three sources of news, while general radio stations were an important source for a slightly lower proportion of respondents (33.5%). Billboards and posters and events/workshops were the two least frequently mentioned source of news, with 8.4% and 2.7% of respondents indicating these sources as

one of their three primary sources of news, respectively.. In response to a separate question, slightly more than 55% of respondents indicated they used the Internet to get their local and regional news.

- **There is a low level of awareness among respondents about Carolina Clear.** Nearly 89% of respondents indicated they had never heard of Carolina Clear. Only 3% of respondents indicated they were aware of Carolina Clear and aware of its programs; just over 8% indicated they had heard of Carolina Clear, but were unfamiliar with the organization's 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 the Pee Dee region of 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 Pee Dee region. 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.

The population of the Pee Dee region of 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 seven zip code areas in the Pee Dee region:

29161	29505	29530	29541
29501	29506	29532	

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 in August 2009. A total of 399 Pee Dee residents were surveyed, for a margin of error of plus or minus 5%, with a 95% confidence level.

Slightly more than 31,000 phone calls were made to complete the survey. The completed response rate for the survey was 9.2%. 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 Pee Dee region 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, 26.0% 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 seven zip code areas surveyed). The cooperation rate for this survey of Pee Dee residents was 12.9%.

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 Pee Dee region as reflected in Census 2000 data, the Pee Dee region survey sample was disproportionately female (64.2% of the sample vs. 52.9% of the actual population in the seven zip code areas, as reported by the U.S. Bureau of the Census) and better educated than the general population (with 45.7% of the sample earning a bachelor's degree or higher vs. 19.3% of the general population). With respect to race, 74.5% of the sample was white, as compared to 58.7% 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 (48.5% vs. 28.2%, respectively) and a lower proportion of 18-24 year olds (4.3% of the phone survey vs. 12.9% of the general population). Approximately 85.6% of respondents indicated they were homeowners (as compared to nearly 3/4 (74.6%) 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 Pee Dee residents' views 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 Pee Dee 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 Pee Dee 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?" Thirty-one percent 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: males were more likely than females (Cramer's V = .134; Table E-1); whites were more likely than minorities (Cramer's V = .117; Table F-1);, individuals with some college or a two-year degree were more likely than those with a high school degree or less or those with a bachelor's degree or more (Cramer's V = .132; Table G-1); and individuals age 18-34 years old were more likely than respondents of other ages. (Cramer's V = .145; Table H-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). Slightly more than 81% 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. Minorities expressed more concern than whites about pollution and environmental quality of local waterways (Cramer's V = .176; Table F-2). Nearly all of the respondents (98.1%) age 55-64 indicated they were "very" or "somewhat" concerned about environmental quality (gamma = -.327; Table H-2). The youngest respondents (age 18-34) were least concerned about the environment, although 71.8% of individuals in this age group indicated they were "very" or "somewhat" concerned about the environment. Renters were more concerned than owners about the environment (Cramer's V = .104; Table I-2). There were no sex or educational differences in level of concern about water quality.

Respondents were asked to indicate to what extent they thought people's actions affected the quality of local streams and waterways. Nearly one-half of respondents (49.3%) indicated that people's actions had "a great deal" of impact on water quality (Table D-3). However, 16.7% of respondents indicated that people's actions affected water quality "not too much" or "not at all." Women were more likely than men to indicate that people's actions on land affected water quality "a great deal" or "somewhat" (Cramer's V = .172; Table E-3) and minorities were more likely than whites to indicate this was the case (Cramer's V = .109; 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" (94.5% of college graduates vs. 77.8% of those with a high school education or less) (gamma = -.386; Table G-3).

Concern about the environment is often measured by asking residents to what extent they value certain environmental assets and resources in the community. Respondents were also asked to what extent they felt that water resources were important to the livelihood and quality of life in the Pee Dee region. There was a high level of agreement that these resources are "very important" to the quality of life in the Pee Dee region, with 94.2% of respondents indicating this was the case (Table D-20). And, there were no subgroup differences for this question: respondents were equally likely to rate water resources as important to the livelihood and quality of life in the Pee Dee region, regardless of sex, race, education level, age or homeownership status.

Environmental Knowledge

Respondents' level of knowledge about water quality issues was measured in four 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; (3) a question on the definition of the term "watershed"; and (4) a question regarding the flow of water after rainstorms.

Knowledge of Practices for Protecting Land Along Waterways

A common goal of many watershed and environmental outreach 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.

Slightly more than 91% of respondents indicated that planting bushes and shrubs was a "very" or "somewhat" effective practice (Table D-8). Nearly 87% of respondents indicated that installing a retaining wall was a "very" or "somewhat" effective way to manage land along a river or lake. Slightly more than 84% 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. Respondents were least likely to indicate that keeping vegetation mowed to the edge of the water was a "very" or "somewhat" effective practice, although a sizeable majority (82.9%) indicated that this was the case.

The percentage of respondents indicating they did not know about the effectiveness of these various measures (or, did not respond to the question) was quite high for two measures: 11.7% for keeping vegetation mowed to the edge of the water and 12.8% for installing a retaining wall.

Regarding subgroup differences, there were statistically significant differences by sex for the item relating to planting bushes and shrubs. Males were more likely than females to indicate this was a very effective or somewhat effective land management strategy (Cramer's V = .142; Table E-18).

There were statistically significant racial differences for three of the four questions. Minorities were far more likely than whites to rate keeping grass or other vegetation mowed to the edge of the water as a "very" or "somewhat" effective strategy and a much larger proportion of whites than minorities were likely to indicate this practice was "not at all effective" for managing land along a river or lake (Cramer's V = .279; Table F-17). Minorities were more likely than whites to indicate that planting bushes and shrubs was "not at all effective" for managing land in an environmentally-friendly way (Cramer's V = .129; Table F-18). Whites were twice as likely as minorities to indicate that installing a retaining wall was "not at all effective" for managing land along a river or lake in an environmentally-friendly way (Cramer's V = .139; Table F-19).

For education, individuals with some college or a two-year degree were most likely to indicate that keeping grass or other vegetation mowed to the edge of water was a "very effective" method for managing land along a waterway (gamma = .115; Table G-17). Twice as many college graduates as individuals in the other two educational groupings rated this practice as "not at all effective."

Regarding age differences, for three of the four items, individuals age 65 and older were far more likely to indicate that the practice was "not at all effective" for managing land along local waterways in an environmentally-friendly way: allowing natural vegetation to grow wild (gamma = .283; Table H-16); keeping grass or other vegetation mowed to the edge of the water (gamma = .159; Table H-17); and planting bushes and shrubs (gamma = .229; Table H-18). For all three of these items, individuals age 18-34 were most likely to rate the practice as "very effective."

Renters were more likely than owners to rate two practices as "very effective" for managing land along local waterways in an environmentally-friendly way: keeping grass or other vegetation mowed to the edge of the water (Cramer's V = .131; Table I-17) and planting bushes and shrubs (Cramer's V = .161; Tables I-18).

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 60 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., "clean up regularly" and "don't throw trash") or enforcing laws (e.g., "enforce pollution laws by not allowing people to dump toxic things in our waters" and "reinforcing laws on dumping and disposal of hazardous chemicals"). Similarly, some respondents suggested crafting more effective legislation to control pollution. Other respondents mentioned the need for more education or described using more "natural" strategies, such as planting more trees and vegetation.

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 3 /4 (73.6%) of respondents indicated they "strongly agreed" or "agreed" that "inspection and pump out of septic tanks protects water quality" (Table D-4). However, 15.6% indicated "do not know" for this question. And, there were no statistically significant differences for any of the demographic subgroups for this question. Regardless of sex, race, education level, age or homeownership status, respondents were equally likely to agree (or, to disagree) with this question.

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 64% of respondents believed that this water is not treated, while 24.4% indicated that "yes, it is treated." Nearly 12% of respondents indicated "do not know" for this survey item (Table D-6).

Minorities were more likely than whites to believe that stormwater was treated before reaching local streams, rivers or beaches (Cramer's V = .115; Table F-6). In terms of educational differences, individuals with a high school degree or less were most likely to agree with this statement, while those with the highest levels of educational attainment were least likely to agree that the stormwater was treated (Cramer's V = .126; Table G-6). Individuals age 18-34 and age 55-64 were most likely to indicate that stormwater was treated, with 38.7% and 24.9% indicating this was the case, respectively; individuals 35-54 were least likely to agree (Cramer's V = .240; Table H-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 Pee Dee residents with residents from other areas.

When asked to choose the correct definition of the term "watershed," slightly more than one-fourth (25.2%) of respondents selected the correct answer ("area that drains into specific river or lake"). A nearly equal percentage (23.9%) selected "reservoir that serves as a municipal water source" as the correct answer. Nearly 17% indicated they did not know the correct definition (Table D-9). Relatively equal proportions of Pee Dee respondents selected either "an area that retains water like a swamp or marsh" (15.1%) or "a small building where water is stored" (15.0%) 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 Pee Dee residents.

As indicated in Table J-2, a few respondents have their own working definition of the term "watershed," some of which are not very closely related to the actual definition (e.g., "watershed filters out water" and "where an area builds up and the water that pours over the build up.")

Regarding subgroup differences in this basic knowledge about watersheds, only race differences were detected. While whites and minorities were equally likely to select the correct definition for the term "watershed" and an equal proportion were likely to indicate "do not know," a higher proportion of minorities than whites selected "small building where water is stored" as the correct definition, while a higher proportion of whites than minorities selected "an area that retains water like a swamp or marsh" (Cramer's V = .164; Table F-20).

Knowledge of Local Water Bodies

An additional question was included on the telephone survey to determine respondents' knowledge about local bodies of water and their familiarity with the basics of water flow. Respondents were asked "To the best of your understanding, when rain falls where you live which body of water most directly absorbs the runoff? Can you tell me the specific water body (e.g., creek, stream, or river) that directly absorbs the runoff from rain that falls where you live?" The possible responses to this question were: "Yes, I certainly can name the waterbody"; "Yes, I can, although I am not absolutely sure"; and "No, I do not know what body of water receives the runoff from rain that falls where I live." If they indicated they certainly could name the body of water or if they indicated that they might be able to name the body of water, respondents were asked to provide the name of that body of water.

Slightly more than 21% of respondents indicated that "yes, I certainly can name the body of water." One-fourth of respondents indicated they thought they could name the water body. However, a majority of respondents (53.9%) indicated "no, I do not know the name of the water body" (Table D-23). Those respondents who indicated some level of familiarity were given an opportunity to name that body of water. Table J-7 and Table J-8 provide the open-ended responses to this question.

There were sex, race, education and homeownership differences in respondents' propensity to indicate they were familiar with the waterbody that most directly absorbed runoff from rain. Males were more likely than females to indicate that they could "certainly" name the waterbody, while females were far more likely than males to indicate they did not know (Cramer's V = .235; Table E-49).

Whites were more likely than minorities to indicate that they could "certainly" name the waterbody, while minorities far more likely than whites to indicate they did not know the name of the waterbody (Cramer's V = .173; Table F-49). For education, individuals with a high school degree or less were far more likely than others to indicate they could not name the waterbody (Cramer's V = .252; Table G-49).

Owners were more likely than renters to indicate they could certainly name the correct waterbody that received stormwater runoff (Cramer's V = .241; Table I-49). And, a much higher proportion of renters vs. owners was likely to indicate that they could not name the waterbody.

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 bodies: 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 64% 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 and automobiles (55.3%), farm operations (43.2%), and fertilizer and lawn chemicals that people use on their lawn and garden (41.8%). A relatively small proportion of respondents indicated that pet waste (21.2%) and waste from birds (20.0%) had a "great impact" on the water quality of local streams and lakes.

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 eight of the nine practices had a "great" or "some" impact on water quality (see Table E-7 through Table E-15). The only item for which there were no statistically significant differences between men and women was industrial sites. The relationship between gender and assessment of the impact of these eight factors on water quality was moderately strong to strong, as indicated by the Cramer's V values of between .121 (for "fuel and oil leaks" and "farm operations") to .296 (for "sediment or dirt from construction sites").

Regarding the statistically significant racial differences, for four survey items, minorities were more likely than whites to indicate that all four sources of pollution had a "great" or "some" impact on the water quality of local waterways: 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 .188 (for "sediment or dirt from construction sites") to .283 (for "pet waste").

Regarding education, individuals with a high school degree or less were much more likely to indicate that farm operations (Cramer's V = -.478; Table G-13) and parking lot runoff (Cramer's V = -.406; Table G-15) had "very little" or "no" impact on the water quality of local streams and lakes. Individuals with a bachelor's degree or more were most likely to indicate that farm operations had a "great" or "some" impact on water quality, while individuals with some college or a two-year degree were most likely to indicate that parking lot runoff had a "great" or "some" impact.

There were statistically significant differences between age groups in the assessment of the impact of two of the nine sources of pollution. The youngest respondents (age 18-34) were most likely to indicate that pet waste had "very little" to "no" impact on local streams and lakes (gamma = -.228; Table H-9), while individuals 55-64 were most likely to indicate that farm operations had a "very little" or "no" impact on local streams or lakes (gamma = .121; Table H-13).

Renters and owners differed significantly in their assessment of the impact of three of the nine sources of pollution. Renters were more likely than owners to indicate that pet waste (Cramer's V = .208; Table I-9) and runoff from people washing their cars (Cramer's V = .182; Table I-11) had a "great" or "some" impact on water quality. Owners were more likely than renters to indicate that parking lot runoff had a "great" or "some" impact on local streams or lakes (Cramer's V = .105; Table I-15).

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 68% of respondents 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 = .135; Table E-5) to "strongly agree" or "agree" that pet waste is a source of bacteria pollution in lakes, rivers, and streams. Otherwise, there were no additional subgroup differences in the level of agreement with this item about the impact of pet waste on 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 Pee Dee 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, hiking/walking, visiting the beach, and fishing were the three most popular recreational activities for respondents (with 42.3%, 37.0%, and 35.2% of respondents indicating they participated in these activities "often" or "sometimes", respectively). The lowest participation rates were recorded for hunting/trapping and kayaking/canoeing (11.0% and 4.4% of respondents indicating they participated in these activities "often" or "sometimes", respectively).

The results indicate a number of subgroup differences in levels of participation in the various recreational activities. For five 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), visiting the beach (Table E-25) and hunting/trapping (Table E-27). The relationships between gender and participation in recreational activities were moderately strong, with Cramer's V's ranging from .116 (for motorboating) to .282 (for fishing). Men and women were equally likely to participate (or, not participate) in kayaking/canoeing and hiking or walking in parks or other protected land.

Racial differences in participation were observed for six of the seven outdoor recreational activities. Whites were more likely than minorities to participate "often" or "sometimes" in fishing (Cramer's V = .179; Table F-22), swimming (Cramer's V = .311; Table F-23), motorboating (Cramer's V = .450; Table F-24), visiting the beach (Cramer's V = .123; Table F-25), and hunting/trapping (Cramer's V = .303; Table F-27). However, minorities were more likely than whites to hike or walk in public parks or other protected areas (Cramer's V = .103; Table F-26).

There was a positive relationship between education and likelihood of participating in two of the seven activities. Individuals at the highest level of educational attainment (bachelor's degree or higher) were most likely to indicate they "often" or "sometimes" went motorboating (gamma = -.288; Table G-24) and visited the beach (gamma = -.278; Table G-25). And, individuals with the least education (high school diploma or less) were much more likely than others to indicate they "never" participated in these two activities.

As indicated in Tables H-21 through H- 27, the relationships between age and recreational participation for six of the seven activities (fishing, swimming, motorboating, visiting the beach, hiking, and hunting/trapping) were statistically significant and very strong, with gammas ranging from .396 (for hiking/walking) to .600 (for hunting/trapping). And, the age pattern of participation was fairly consistent across all four of these activities: individuals age 18-34 were most likely to participate, while individuals 65 and older were least likely of all age groups to participate "often" or "sometimes" in four of these activities: fishing, swimming, hiking/walking, and hunting/trapping. For the other two activities (motorboating and visiting the beach), individuals age 55-64 were least likely to indicate they "often" or "sometimes" participated in these activities.

Owners were more likely than renters to indicate they "often" or "sometimes" participated in three of the seven activities: swimming (Cramer's V = .194; Table I-23), motorboating (Cramer's V = .225; Table I-24), and visiting the beach (Cramer's V = .171; Table I-25).

Participation in More General Positive Behaviors

A major goal of many environmental education efforts is to promote environmentally-friendly behaviors among residents. Pee Dee 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 Pee Dee 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 (73.3% of respondents indicating "yes" to this question), followed by reducing water usage out of concern for water quality (45.1%), participating in a clean-up event (20.8%) and joining or volunteering for a conservation or environmental organization (9.0%). Regarding the latter item, Table J-3 indicates that respondents are involved in a broad variety of local organizations (e.g., "a local group that is involved in roadside clean-up," Pee Dee Conservation, and the Florence County Council) and national organizations (Sierra Club, National Wildlife Federation, and the World Wildlife Fund).

Regarding subgroup differences, there were significant differences between men and women for three of the four activities. Men were more likely than women to indicate they participated in all three of these activities in the past two years: reducing water usage out of concern for water quality (Cramer's V = .105; Table E-29), participating in a clean-up event (Cramer's V = .142; Table E-30), and joining or volunteering for an environmental organization (Cramer's V = .173; Table E-31).

Regarding racial difference in participation, whites were more likely than minorities to reduce water usage out of concern for drought conditions (Cramer's V = .156, Table F-28). 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 only one of the four activities: individuals at the highest level of educational attainment were most likely to indicate they had joined or volunteered for an environmental organization in the past two years (Cramer's V = .162; Table G-31).

Participation in positive behaviors varied by age for participating in a lake, river or roadside clean-up event (Cramer's V = .179; Table H-30), with individuals age 18-34 indicating the highest participation rates (with 29.8% indicating "yes", as compared to between 13.2% and 15.6% of individuals in the other three age groups).

Owners were more likely than renters to indicate they had reduced water usage out of concern for drought conditions (Cramer's V = .209; Table I-28) and joined or volunteered for an environmental organization (Cramer's V = .102; Table I-31).

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, Pee Dee residents seemed to be participating in positive environmental behaviors and refraining from participating in negative household behaviors (Table D-15). Nearly 78% of respondents indicated they "always" or "nearly always" considered the likelihood of rain before treating their lawns with fertilizers or pesticides. A slight majority (55.5%) 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 (80.9%), disposing of oil, paint or other chemicals down storm drains (97.3%), storing fertilizers and pesticides in leaking containers (97.5%), and dumping grass clippings down storm drains or backyard creeks (98.0%). 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 32.9% 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 three of the seven behaviors. Females were more likely than males to indicate the "always" or "nearly always" considered the likelihood of a rainstorm before applying fertilizers or pesticides to their lawn (Cramer's V = .235; Table E-34). Males were more likely than females to indicate they "always" or "nearly always" operated a motor vehicle with a leak (Cramer's V = .111; Table E-36) and washed their car on lawn or gravel instead of pavement (Cramer's V = .147; Table E-38).

There were no race differences in participation in these seven household-based activities. Whites and minorities were equally likely to participate (or, to not participate) in each of the seven activities.

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 = -.481; Table G-35); individuals with the lowest level of education were most likely to indicate they "hardly ever" or "never" picked up after their pet.

Age differences were observed for one of the seven activities: individuals age 18-34 were most likely to indicate they "always" or "nearly always" considered the likelihood of a rainstorm before applying fertilizers or pesticides to their lawns (gamma = .459; Table H-34). Individuals age 56-64 were most likely to indicate they "hardly ever" or "never" did this (with 57.1% of 55-64 year olds providing this response as compared to just 5.6% of 18-34 year olds).

Owners were more likely than renters to indicate they "always" or "nearly always" picked up after their pet while taking their pet for a walk (Cramer's V = .200; Table I-35). Otherwise, renters and owners were equally likely to participate (or, to not participate) in the remaining six activities.

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, while nearly 1/4 of respondents (24.3%) indicated that someone from outside the household was responsible for this task (Table D-12). Nearly 23% 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, nearly 60% of respondents indicated that they did not use fertilizers.

Subgroup differences were observed for just the item related to mowing the lawn, and these differences were observed for all five sociodemographic categories. The following subgroups were most likely to indicate that mowing the lawn was handled by either themselves or another household member: women (Cramer's V = .139; Table E-32); whites (Cramer's V = .240; Table F-32), individuals with some college or a two-year degree (Cramer's V = .175; Table G-32), the youngest respondents (18-34) (Cramer's V = .168; Table H-32); and owners (Cramer's V = .390; Table (I-32).

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 13.5% 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 (7.3%) or relying on advice from friends or neighbors (3.3%).

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 (47.5% of respondents) or to put them in the trash (11.4%) (Nearly 1/4 of respondents indicated they did not use these products.) (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 "completely using up the products until they are gone" to "putting them in special garbage bags" to digging a hole and putting them in.

For those respondents with a septic tank, just over one-third of respondents (34.7%) indicated they had never had their septic tanks inspected or pumped out over the previous five years. A nearly equal percentage of respondents (32.9%) indicated they had had their septic tank inspected or pumped out once in the previous five years. Nearly 11% of respondents 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 local and regional information and news were TV evening news (78.7%), TV morning news (57.1%) and local newspapers (35.7%). Radio stations were cited by nearly 1/3 of respondents as a source of information. Regional newspapers were also an important source of information as nearly 1/4 of respondents (24.2%) selected this as one of their top three sources of 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 8.4% and 2.7% 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-6 indicates that respondents obtain regional and local news and information through several different channels, including news magazines and news pamphlets, public television, the weather channel, and CNN.

A majority (54.2%) 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 race, education, age, and homeownership status. Whites (61.6%) were more likely than minorities (48.5%) to use the Internet (Cramer's V = .131; Table F-48); the more education one has, the more likely they are to use the Internet (Cramer's V = .218; Table G-48); the younger a respondent the more likely they were to indicate they use the Internet for local and regional information and news (Cramer's V = .344; Table H-48); and home owners (58.2%) were more likely than renters (44.1%) to use the Internet (Cramer's V = . 133; Table I-48). Women and men were equally likely to use the Internet as an information source (Table E-48).

Awareness of Environmental Organizations

Respondents were asked to what extent they were familiar with Carolina Clear. Slightly more than 11% of respondents indicated they had heard of Carolina Clear and were either familiar or not very familiar with the agency's programs; nearly 89% indicated they had not heard of Carolina Clear (Table D-19). For those respondents who had heard of Carolina Clear, Table J-5 reveals that respondents had heard of the agency from a variety of sources, including family and friends who had a connection with Clemson University, through various media sources, and through their work roles.

The data reveal that there were sex, race, and home ownership differences in the respondents' level of familiarity with Carolina Clear. Females were more likely than males to indicate they had not heard of Carolina Clear, while males were more likely than females to indicate a mid-range level of familiarity with the organization (i.e., they had heard of Carolina Clear, but were not familiar with its programs) (Cramer's V = .154; Table E-46). Whites were more likely than minorities to indicate they had heard of Carolina Clear, but were not familiar with its programs, while minorities were more likely than whites to indicate they had not heard of Carolina Clear (Cramer's V = .256; Table F-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 Pee Dee 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 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 92.0% of respondents indicating they would "very likely" or "somewhat likely" become involved if they were being directly impacted by water pollution.

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 local media ran stories on local water pollution problems (Cramer's V = .103; Table E-43) or ran stories on positive actions taken by local residents to improve water quality (Cramer's V = .168; Table E-44).

There were statistically significant differences between whites and minorities for three of the five items. Minorities were more likely than whites to become involved in water quality issues if they knew the local government could save money in the long run by taking action to improve water quality (Cramer's V = .102; Table F-42), if local media ran stories on local water pollution problems (Cramer's V = .166; Table F-43) and if local media ran stories on positive actions taken by local residents to improve water quality (Cramer's V = .151; Table F-44).

For all five scenarios, there were no educational differences in likelihood of becoming involved in water issues. However, there were age differences for all the activities, except for the item regarding being directly affected in some way by water pollution. For the other four items, the youngest respondents (age 18-34) were most likely to indicate they would "very likely" or "somewhat likely" become involved in water quality issues. Individuals age 55-64 were least likely to indicate they would "very likely" or "somewhat likely" become involved for each of the five scenarios (Tables H-41 through H-44). The relationship between age and likelihood of involvement in water quality issues was very strong as indicated in the strength of the gamma values, which ranged from .444 (for local media running stories on local water pollution problems) to .659 (if respondents had more information about local water quality issues).

Regarding home ownership status, owners were more likely than renters to indicate they would "very likely" or "somewhat likely" become involved in water quality issues if they were being directly affected in some way by water pollution (Cramer's V = .104; Table I-45). Otherwise, for the remaining four scenarios, renters and owners indicted an equal level of willingness to become involved in water quality issues.

Recommendations

The survey results provide rich information about the views and opinions of Pee Dee 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 Pee Dee 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 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 to the environment. While concern among Pee Dee residents was high and comparable to levels of concern in other watersheds, knowledge about watershed basics was quite low. The ability of Pee Dee 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 Pee Dee 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.
- An encouraging sign is the fact that Pee Dee 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, a majority of Pee Dee respondents (53.5%) indicated they would "very likely" become involved if they knew the government could

save money, but a much greater proportion of respondents (84.7%) 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 Pee Dee residents about environmental issues and opportunities for involvement, it would be advantageous to use various forms of media, especially television news, local newspapers and general radio stations. Human interest stories, featuring stories about personal impacts on the environment, and the impact of water quality on residents of the Pee Dee region, could be especially effective.
- Given that a majority of Pee Dee 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.

- In terms of gender, women were more likely than men to feel that various sources of pollution had a "great" impact on water quality. However, 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 data suggested some important racial differences in some of the key research variables. Minorities were more concerned about the environment and were more likely than whites to rate the various sources of pollution as having a "great" impact on water quality. Importantly, minorities also expressed a greater willingness to become involved in water quality issues for several of the scenarios presented. This level of concern and willingness to get involved was higher than whites, despite minorities having lower rates than whites of participation 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, although the youngest respondents (age 18-34) expressed the lowest level of concern about the environment, 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.
- Since individuals age 55-64, and 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 these residents. 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, renters 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). 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 the Pee Dee region of South Carolina. 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. Pee Dee 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.

References

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