

A SURVEY OF PUBLIC KNOWLEDGE, OPINIONS, AND SENSE OF EMPOWERMENT  
REGARDING AQUATIC ENVIRONMENTAL ISSUES: IMPLICATIONS FOR PUBLIC  
INVOLVEMENT IN CONSERVATION PLANNING IN THE ETOWAH RIVER BASIN

by

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ABSTRACT

In response to the declining status of the Etowah River an interdisciplinary team from federal, state, and local interests is developing the regional Etowah Habitat Conservation Plan (HCP). Public participation is an important component in the Etowah HCP. A first step in the HCP process was to conduct a survey to assess residents' knowledge, opinions, and sense of empowerment regarding the Etowah River. Results indicate that residents' are concerned about aquatic biodiversity and increased development in the watershed. These results provide baseline data for the Etowah public involvement and education program and the *Etowah Education Initiative*, a component of the education program. In the *Etowah Education Initiative* middle schools students, teachers and community members learn about and help address environmental issues in the watershed. As part of the Etowah public involvement and education program, the *Etowah Education Initiative* works toward increasing public participation, awareness and stewardship in the Etowah watershed.

INDEX WORDS: Etowah River, Survey, Public participation, Knowledge, Opinion, Sense of empowerment, Environmental education, Democratic service learning, Middle School

THE ETOWAH ENVIRONMENTAL SURVEY AS A GUIDE FOR THE ETOWAH PUBLIC  
INVOLVEMENT AND EDUCATION PROGRAM

by

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## CHAPTER 1

### INTRODUCTION

#### *Background*

The Etowah watershed is located in north Georgia, just north of metropolitan Atlanta (see Appendix A for a map of the Etowah). As a part of the southern Appalachian mountains, the Etowah is well known for its unique biodiversity in flora and fauna. The Etowah River supports 91 historically native fish species (15 are extirpated), or 26 percent of the total fish species in the southern Appalachian system (Burkhead, Walsh, Freeman, & Williams, 1997). Along with its high diversity of fishes, the Etowah River also has more imperiled aquatic species than any other stream of similar size in the southeastern United States. Currently, there are 15 species (9 fishes, 5 mussels, and one aquatic insect) that are federally or state listed as threatened or endangered, or that are likely-candidates for federal listing (Burkhead et al., 1997). The status of the aquatic life of a river system is often an accurate indicator of the past or present quality of the water and management of the watershed.

Documented since at least 1867, most of the Etowah River mainstem and its tributaries have been cloudy and muddy from soil erosion caused by deforestation and other land disturbances (Burkhead et al., 1997). Today, the major threats to the health of the river and its aquatic species include sedimentation, pollutants and toxins, fragmented habitat, hydrologic alteration, habitat alteration, and exotic species. Current research points to urbanization as the main source of these threats (Freeman, Wenger, McClurg, & Straight, 2002).

Not only does the aquatic life depend on the health of the Etowah River, so do the residents of the watershed, who use the river for drinking water, fishing, swimming and other recreational activities, and sewage treatment. The Etowah watershed is also in a popular area,

near metropolitan Atlanta, and therefore is undergoing rapid development. As development continues to cover the land, scientists are recognizing the declining status of the river and its aquatic fauna and are providing suggestions for improvement (Burkhead et al., 1997, Freeman et al., 2002). One of these suggestions is local government and public involvement in the issues. In order for any improvements to be made, those who live in the watershed and make important policy decisions must also understand and participate in the issue. The role of the Etowah River as a resource to those who live in the watershed makes public involvement and education particularly significant in improving the status of the river.

In 1997, scientists publicized the imperiled status of the Etowah River and developed a framework for a restoration plan for the watershed (Burkhead et al., 1997). This framework provided recommendations for a regional plan that considers ecosystem level functions of the watershed. The framework described steps to ensure the development of a successful plan, which included the involvement of local private, business, and government interests in the development and implementation of the restoration plan. Other priorities of the framework included coordinating existing local and regional efforts in managing growth and watershed protection, and increasing communication and organization of resource management in the watershed (Burkhead et al., 1997).

In 2002, several scientists and other researchers developed a guide for restoration and management efforts in the Etowah watershed, specifically focusing on the major threats, or stressors, to the imperiled and other sensitive fishes of the Etowah River (Freeman et al., 2002). Along with identifying the stressors and their sources, the guide recommended tools that local governments can use to minimize threats and protect aquatic resources. Among others, these tools included conservation planning, public education, and developing a marketing plan for the Etowah watershed (Freeman et al., 2002).

In response to the declining status of the Etowah River and the need for a management and watershed protection plan, an interdisciplinary team of scientists, lawyers, educators and

policy analysts (the HCP Advisory Committee) began developing a regional Habitat Conservation Plan (HCP) for the Etowah watershed. An HCP is a document that is required by Federal law, under the Endangered Species Act (ESA), in order to receive an Incidental Take Permit (ITP). An ITP is a permit that the U.S. Fish and Wildlife Service grants to non-Federal activities to allow “take” (harm, wound, kill, collect, etc) of threatened or endangered species. Those responsible for these particular actions must submit an HCP to the U.S. Fish and Wildlife Service that explains specific measures the activities will follow in order to minimize impact on the species. A regional HCP for the Etowah watershed will take the place of multiple individual plans and will provide development guidelines for the entire watershed. The goal of the Etowah HCP is to plan for both regional development and conservation of the imperiled aquatic species. The Etowah HCP is unique among others in the United States in that it involves multiple county and city governments in the watershed, and therefore will require effective coordination of local government representatives and stakeholders.

Research into other HCPs reveals the importance of public participation in the development of a successful plan (Ormes, 2002). To incorporate public participation into the Etowah HCP, the HCP Advisory Committee is working with local government representatives to develop a public involvement and education program. Early in the process, the HCP Advisory Committee also recognized the need for a survey of the residents in the watershed to assess public knowledge, opinions, and sense of empowerment toward the Etowah River. The survey was intended to direct the public involvement and education campaign and provide baseline information for evaluating its success.

### *Purpose of Study*

The purpose of this study is to evaluate the results of the Etowah public environmental survey. In this study, I will establish the need for this survey as a guide for the Etowah public involvement and education program as part of the Etowah HCP. I will also provide recommendations for the education plan based on the survey results. The research question

that guides this study is: How should a public environmental survey contribute to the framework for a public involvement and education plan? In Chapter 2, I provide background information on the importance of public involvement and education in Habitat Conservation Plans and other local environmental issues. I outline the important components of public involvement and education programs, including surveys as an initial technique, and provide case studies as examples. Chapter 3 contains the methodology for the development and implementation of the survey, and in Chapter 4, I provide the survey results. In Chapter 5, I explain how these results will further guide the Etowah public involvement and education campaign. I also discuss implications and make recommendations for the science and environmental education in schools in the Etowah watershed.

## CHAPTER 2

### LITERATURE REVIEW

In this chapter, I provide a framework for the use of the Etowah public environmental survey as an initial step in the Etowah HCP public involvement and education program. Beginning with a review of the status of the Etowah River, I provide background information on HCPs and public participation in these plans as well as other education programs. I also describe important components of public involvement and education plans, including knowledge, communication, participation, and multiple approaches. In addition to these components, I discuss the importance of using surveys as a first step to designing a public education and involvement program. In each section, I provide case studies and examples of successful and unsuccessful programs to highlight the importance of the different components.

#### *Public Involvement in the Etowah Habitat Conservation Plan*

As development continues to increase in the Etowah watershed, many local government officials have been making important decisions without communicating with other key players (e.g., other local government officials and government agencies, environmental and watershed organizations, researchers, or stakeholders) and considering cumulative impacts across the watershed (Burkhead et al., 1997). For several years, scientists or other researchers have recognized the negative effects of this type of policy on the health of the Etowah River and its aquatic species and have recommended changes (Burkhead et al., 1997; Freeman et al., 2002). In addition, some local government officials in the watershed have noticed the negative impacts and have begun to work with researchers and other interested parties to make improvements.

One of the first tasks for the HCP Advisory Committee in developing the regional Etowah HCP (described in the *Background* section of Chapter 1) was to communicate with local government officials about the need for an HCP and encourage them to be involved in the

process. Because local government officials in the watershed are aware of the status of the Etowah River and the federally listed aquatic species (e.g., *Etheostoma scotti*, the Cherokee darter), many were interested in participating. Currently, local government representatives from 8 of the 11 counties and 11 of the 17 municipalities in the Etowah watershed are working with the Advisory Committee in developing the HCP.

While there are many important components of the Etowah Habitat Conservation Plan, research into other HCPs reveals that one of the most important components that will contribute to the overall success of the plan is public involvement and education (Ormes, 2002). These HCPs, as well as other public involvement and education programs, provide insight into designing a unique program for the Etowah watershed.

One of the requirements established in the Endangered Species Act in developing an HCP is to open the plan to public comment for at least a 60-day period. Based on experiences with previous HCPs, the U.S. Fish and Wildlife Service (FWS) is now recommending more active involvement with the public. The FWS published a Final Addendum to the HCP Handbook that addressed public participation as an important issue of consideration (U.S. Fish and Wildlife Service (USFWS), 2000). This addendum considers the experiences of those involved with HCPs as well as written public comments submitted by individuals, various organizations, government agencies, and businesses and corporations (USFWS, 2000).

According to the addendum, stakeholders' participation in the development phase of an HCP can help in "identifying key components of uncertainty and determining alternative strategies for addressing that uncertainty" (USFWS, 2000, p. 35,256). These uncertainties refer to questions that have not yet been answered by current research. More input from a variety of local interests leads to more options for addressing these questions. Public participation in the HCP process provides an opportunity for stakeholders to specify components of the HCP that are unclear or that do not address the issues that are important to them as well as to provide input based on their experiences in the watershed. The FWS also suggested that public

participation throughout the development of the HCP saves time in the processing of the permit application. In conclusion, the FWS stated that more public involvement throughout the development of the HCP will increase the chance of ultimate acceptance (USFWS, 2000).

Research into other HCPs with similar aspects to those of the Etowah plan also reveals the important role of public involvement in the success of developing an HCP (Ormes, 2002). For example, the Sonoran Desert Conservation Plan (SDCP), in Pima County, AZ emphasizes public involvement as an important component of the development process (Maeveen Behan, Assistant to the County Administrator, Pima County, AZ, personal communication, March, 2002). The Steering Committee of the SDCP consisted of a variety of interests, including ranchers, homeowners and environmentalists, had 84 members, and conducted over 400 educational public workshops and meetings throughout the four-year development process. Those involved with the SDCP kept all meetings and correspondence open to the public and worked closely with interest groups and individuals in addressing concerns and incorporating appropriate input into the plan (Kellis, 2002).

The original conception of the SDCP was to develop an HCP in order to allow development to continue in the Tuscon area, while still protecting the endangered pygmy owl and its habitat. Environmentalists in the area encouraged the county board of supervisors to take a broader, more aggressive approach and develop a plan that considers all of the endangered flora and fauna in the area. The SDCP is a land-use plan that carefully considers the biology of the desert and areas in which development would be most threatening. While the plan has not yet been put into effect, and it is too early to recognize positive effects on the desert flora and fauna, there are several aspects to the plan that prove the success of public involvement (Morlock, 2002).

The SDCP is a comprehensive plan that considers several important issues in the Pima County area, including ranch conservation, cultural and historic site preservation, protection of mountain parks, riparian conservation, and connection of biologically important land. Involving

the public in the development of the SDCP throughout the process helped to identify these components as well as improve public understanding of the importance of protecting the natural resources and history of the desert (Maeveen Behan, personal communication, 2002; Morlock, 2002). The SDCP is also designed to work with developers in the area. The process for developers to receive a permit through the SDCP is less time consuming and less risky, regarding regulations of the Endangered Species Act and FWS, than going through the permit process on their own. In addition, components of the SDCP allow for development on thousands of acres of land, while still protecting essential habitat. Although those involved in the SDCP are facing challenges, (e.g., the city of Tuscon has not yet signed on to the plan), they are confident that plan will be successful in both protecting the desert, and allowing for economic growth (Morlock, 2002).

Several aspects of the SDCP make it a useful case from which to learn about developing the Etowah HCP public involvement and education program. Similar to the Etowah HCP, the SDCP covers multiple species across a large area with a variety of public interests. The SDCP also considers both the natural and cultural history of the area. As discussed above, involving the public throughout the development of the SDCP contributed to its early success in addressing many important issues and satisfying many stakeholders, including developers. Similar to the SDCP, encouraging public participation in the development of the Etowah HCP will help to develop a plan that is unique to the watershed and incorporates the needs of the community in to the plan. Considering that the development of the Etowah HCP involves many local governments, public participation will be an essential part of learning about the interests and needs of each county and municipality, and incorporating these into the HCP. We can also learn from the SDCP that successful public participation is an open process that encourages public involvement in all stages of developing and implementing the HCP.

### *Public Involvement and Education Programs*

Members of a community have a basic right to receive useful information and a right to participate in environmental issues. It is not only our right to participate in local environmental issues but it is also our responsibility (Lubchenco, 1998), and some research suggests that the state has a responsibility to provide the information and opportunities for involvement (Ehrlich, 1999; Popovic, 1993). We (the 'public') depend on the environment for natural resources (e.g., water, air, trees and food) and "ecosystem services [such as] purification of water, generation and renewal of soil, pollination of crops and natural vegetation, [and] dispersal of seed and translocation of nutrients" (Daily, 1997 in Lubchenco, 1998, p. 492).

Although our actions are the primary sources of environmental problems that we face today, our actions are not necessarily destructive. Research, technology, and experiences with nature are proving more and more that we have the capacity to live with nature rather than against it. For example, growing community gardens, installing green roofs, recycling water, energy and material goods, and utilizing porous pavement are a just a few of the many ways we use both nature and technology to reduce impacts on our environment. Through research and technology we also learn about our past impacts on the environment and how we can make improvements. Environmental public involvement and education programs function as vehicles for these types of actions by providing the appropriate information and opportunities for communities to learn about and practice sustainability in their local environment.

Today, public involvement in environmental issues is "commonplace" (Konisky & Beierle, 2001, p. 815), and there are many examples of programs from which we can learn about developing and implementing a successful plan in the Etowah watershed. There are several components that contribute to effective public involvement programs, and these include knowledge, communication, participation, multiple approaches, and surveys. In the following sections, I discuss each of these components and provide case studies to demonstrate their contribution to public involvement and education programs.

*Knowledge.* Acting in an environmentally sound manner requires a basic understanding of ecosystem function, human interactions with the environment, and actions to take to decrease negative impacts (Bogner, 1998; Ehrlich, 1999; Hungerford & Volk, 1999). Although the complexities of ecosystem function will continually place limits on our understanding, there is always an opportunity to learn more. Some environmental research has expressed an “urgent need” for increased knowledge about the environment, increased availability and communication of information to the public and decision-makers, better technology to “minimize the ecological footprints of human activities,” and more direction to make better choices regarding scientific uncertainty (Lubchenco, 1998, p. 495). Although scientific knowledge is not the only tool for public education, it is an essential step toward finding solutions to environmental problems (Hungerford & Volk, 1990). Useful information about the environment helps to determine present conditions, provide direction for approaching uncertainty, and assess the outcome of management decisions (Lubchencho, 1998).

A case study of public perceptions of development issues in a small coastal community in Mexico exemplifies the effectiveness of providing useful information in motivating action toward improving the environment (Tran, Euan, & Isla, 2002). A survey revealed that the community members were concerned about over-development in the area, and some were concerned about the conditions of the water quality. On the other hand, the community was not aware of the connection between development and water quality. Education about human impacts on the environment, in general, and the status and causes of decreased water quality related to increased development helped the community understand the problems and the need for their actions. Increased knowledge also established a sense of control, or empowerment, over the problems and helped motivate them to take action (Tran et al., 2002).

Community members are now participating in a long-term, water quality, monitoring program. Their participation helps accomplish the goals of the monitoring program by identifying current conditions and monitoring changes. The residents' involvement also increases their

knowledge about their local environment and the impacts on it. For example, if residents are collecting data for the water quality monitoring program, they are directly interacting with the environment. This interaction allows for observations, such as changes in water quality, that otherwise may not have been noticed. Through these observations, residents are also given the opportunity to observe what may be causing the changes. Survey results regarding residents' opinions about development in the area also help local government officials better understand plausible options for development planning (Tran et al., 2002). For example, survey results revealed that many residents visualized the island as a quiet community with an emphasis on natural resource management and conservation. Residents also expressed disagreement with the current development practices on the island, such as paved roads, large hotels, and nightclubs. With this knowledge, and continual public participation in important decisions, local government officials can make more holistic decisions regarding development and preservation of the coastal ecosystem (Tran et al., 2002).

*Communication.* Communication is also an important component of learning about and addressing local environmental issues. Communication involves sharing and listening to interests and concerns as well as coordinating efforts to develop plans and work toward solutions (see Cobourn, 1999; Letey, 1999). It is important that key players communicate with one another throughout the process of addressing an environmental issue. Local government officials and the public need to communicate about interests, concerns, and educational needs. This communication helps the local government understand public opinion before making important decisions and increases the public's understanding of the issues for more effective involvement. In addition, local government officials need to keep communication open with the scientific community to learn more about how to face local environmental issues (Letey, 1999).

A case study of Integrated Watershed Management (IWM) in the Truckee River system in eastern California and western Nevada is an example of how communication among key players leads to effective watershed management decisions (Cobourn, 1999). IWM is an

approach that local governments and planners use to better manage water resources. The focus of IWM is a coordination of all “uses, services and values” (Cobourn, 1999, p. 623) in a watershed to work toward better water resource management. Communication is an important component of IWM, including communication and cooperation between stakeholders and all levels of government, education about stakeholder responsibility to water planning and management, and collaboration with existing watershed improvement efforts (Cobourn, 1999).

In the Truckee River system, local governments and key players in watershed improvement projects have worked together to implement Integrated Watershed Management (Cobourn, 1999). Due to long periods of drought, overuse, and rapid development in urban areas, the Truckee River is struggling to supply water and support aquatic species. In addition, two native fishes have been listed as threatened and endangered and one is now extinct. Implementing IWM to develop a watershed plan is part of an effort to manage water resources in the area and improve the status of the river (Cobourn, 1999). After many public workshops, surveys, and discussions, representatives of the watershed groups decided that although they understand the benefits of a large-scale plan, they would be more effective by working on smaller, more manageable projects. These projects include working together to develop a long-term goal for the watershed and to implement water conservation education and public involvement programs. As Cobourn (1999) illustrates, this approach to watershed management is still an effective IWM approach.

Communication and interaction of everyone involved in this project were important aspects to implementing IWM. The key players made an effort to communicate about the effectiveness of IWM and how it would work best for the Truckee River system. They succeeded in developing a plan with attainable goals, while still considering the long-term needs of the watershed. Even though the key players decided not to develop one watershed management plan, they are communicating and coordinating their efforts (Cobourn, 1999).

Communication in Integrated Watershed Management provides many benefits to the local environment. For example, communication in IWM contributes to the holistic approach to water resource management, which involves consideration of the entire ecosystem in identifying problems and developing solutions. Ecosystem management involves communication and coordination of many agencies and interests including local, state, and federal agencies (e.g., local watershed organizations, the Department of Natural Resources, and the U.S. Fish and Wildlife Resources), scientists or other researchers, local government officials, and stakeholders. Ecosystem management is beneficial to the environment in many ways and has been recommended by conservation ecologists and politicians as an effective way to manage ecosystems (Meffe and Carroll, 1994, p. 75).

Communication is also an important part of Integrated Watershed Management in considering issues in relation to one another rather than as separate problems, thus working toward a more effective solution (Cobourn, 1999). Local governments, stakeholders, and other key players in the Truckee River system demonstrated this approach by working together and sharing their interests and concerns to identify all of the important issues related to water resource management in their area. As Cobourn (1999) illustrates, communication is an important component of implementing IWM, and if the key players in the Truckee River system continue to work toward IWM, the river will begin to show the benefits (Cobourn, 1999).

A case study in the San Joaquin Valley of California is an example of the environmental damage that can result from inadequate communication between policy makers and the public (Letey, 1999). In order to improve agricultural yield, federal agencies implemented a surface water irrigation program in the San Joaquin Valley in the early 1900's. In semi-arid regions, like the San Joaquin Valley, increased water tables from irrigation cause soil salinity that can be severely damaging to the lands. Installing drainage systems to alleviate the high water table is essential to mitigate the damage. The San Joaquin Valley irrigation program included plans for drainage, but the plans were never fully implemented. Because the drainage plans were

repeatedly delayed, the salinity in the area reached toxic levels that eventually led to significant mortalities and deformities in birds and bird eggs in the area (Letey, 1999).

When the irrigation program began in the early 1900's, a portion of residents and policy makers thought that the program was innovative and would be highly beneficial. On the other hand, landowners downstream of the irrigation projects were adamantly opposed. These landowners were aware of the possible negative impacts of type of irrigation and recognized that a drainage system was not going to be installed in the immediate stages of the program. The landowners filed an injunction to stop the construction of the irrigation reservoir. The court ruled that a drainage system was in the irrigation plans and that the United States Bureau of Reclamation "was showing good faith in planning the drain" (Letey, 1999, p. 604). The court also stated that the landowners could file suit again if the agency did not follow through with plans (Letey, 1999).

The federal agency knew that drainage was a necessary component of irrigation, because there was a drainage system outlined in the irrigation plans. Listening to the concerns of the landowners and discussing more options for drainage could have highlighted the seriousness of the situation, thus pushing the drainage plans toward quicker implementation. Better communication amongst several key players in this case could have prevented the damage that resulted.

*Participation.* In addition to providing useful information and encouraging communication in addressing local environmental issues, public involvement and education programs need to provide information about actions people can take and opportunities to participate. The public's involvement in decision making processes increases their understanding of the issues, which include the environmental issues and the policies that may be enacted to address them. Increased understanding consequently motivates further long-term action and participation (Konisky and Beierle, 2001; Moorhouse & Elliff, 2002).

Water resource planning in South Central Texas provides an example of effective public involvement in a local environmental issue (Moorhouse & Elliff, 2002). Water supply for the South Central region of Texas depends on Edwards Aquifer, a large capacity limestone aquifer. Federal law requires a minimum flow in the surface waters fed by the aquifer to protect endangered species, but recent drought and increased demands in water supply have depleted the source and are threatening those levels. South Central Texas was one of 16 state-designated regions to develop a water resource plan. The designation was part of a larger state effort to address current and future water needs (Moorhouse & Elliff, 2002).

In order to develop water resource plans acceptable to the public, the state required each region to develop a planning group with at least one representative from each of 11 categories. The categories were general public, agricultural interests, environmental interests, river authorities, water districts, small business, industry, water utility, electric utility, county, and municipal. The purpose of the planning group, which had voting-member status, was to ensure appropriate representation of stakeholders in the region. Other non-voting members participated in the planning process as well (Moorhouse & Elliff, 2002).

One of the goals of the planning group was to develop a public participation plan that would guide the process of communicating information to the public and incorporating public input into the water resource plan. The public participation plan used a “bottoms-up” (Moorhouse & Elliff, 2002, p. 531-532), or proactive, approach that provided opportunities for public involvement throughout the development of the plan. Although discussions were sometimes intense, the planning group effectively communicated with the public, listening to concerns and suggestions, and incorporated public input into their decisions (Moorhouse & Elliff, 2002).

Organizing participation and input from large groups and different interests can be frustrating and time consuming. The planning group for the South Central Texas public participation plan utilized specific techniques to alleviate these difficulties (Moorhouse & Elliff,

2002). For example, the planning group organized focus groups and targeted audience interactions to create opportunities for discussing interests and concerns. The planners made a variety of educational materials available for the different interest groups, and provided sufficient opportunities for communication between planners and stakeholders at key decision making points. The planners also worked with focus groups to develop criteria to guide the decisions for water supply options and provided interest groups with key messages to guide the planning process. Examples of these messages include: "Water is a limited resource, and as the population of the region grows, the use and availability of this resource must be carefully considered;" and "The Planning Group wants public input to help determine which options are included in the final plan" (Moorhouse & Elliff, 2002, p. 534).

The planning group made significant efforts to incorporate the public into the decision making process. The planning group recognized important aspects of public input that contribute to the success of long-term allocation and conservation of their water supply. Public input from a variety of interests ensured that the plan addressed the unique needs of the region. The experiences of those who live in the watershed and who will be affected by the plan guided the decision making process. In addition, public involvement increased public understanding of the conditions and restrictions laid out in the plan and understanding of how the plan will ensure continued water supply for their homes and businesses (Moorhouse & Elliff, 2002).

*Multiple approaches.* Gardner and Stern (1996) also suggested using multiple techniques in a public involvement and education plan and further recommended combining education with other strategies. There are many reasons community members participate in local environmental issues, just as there are many reasons that they do not. Gardner and Stern (1996) referred to reasons for non-participation as barriers to participation, and suggested that public involvement and education programs work toward reducing these barriers in order to be successful. Barriers to action may involve individual knowledge, attitudes, beliefs, empowerment, attention, or commitment to action. Barriers may also involve factors that

community members cannot directly control, like socioeconomic background, technology, inconvenience, social and political agencies, and economics (Gardner & Stern, 1996).

Programs that are designed to influence environmental attitudes, beliefs, or commitment to action, for example, depend on many factors and are unique to each situation. These types of programs are often long-term, and the effects are difficult to measure (Bogner, 1998; Gardner & Stern, 1996). On the other hand, improvement can occur simply with useful, valid scientific information and participation in the issue. The previously mentioned case study in San Joaquin Valley, CA, is an example of how scientific information can effect a positive change in public attitude (Letey, 2000). For several years the public strongly supported an irrigation program that was beginning to show serious negative impacts on the environment. Although there were problems with communication that contributed to the environmental issues, the reevaluation and investigation of the reservoir project led to more scientifically based discussions about the impacts of the reservoir and agricultural irrigation in the San Joaquin Valley. After talking with scientists and learning more about the impacts of the reservoir and other options for irrigation, the public better understood the problems and had a more positive attitude toward making changes (Letey, 2000).

Providing useful and valid scientific information is a key component of an education program but needs to be used in combination with other approaches to be effective (Gardner & Stern, 1996; also see Bjorkland & Pringle, 2001). For example, in the San Joaquin Valley case the public was influenced by scientists presenting important information about the reservoir and providing an opportunity for the public to discuss the information and provide input and suggestions where appropriate. If the public had been given the information alone, by a pamphlet in the mail, for example, perhaps they would not have been as willing to accept changes.

Gardner and Stern (1996) discussed similar cases in which reducing significant barriers, such as lack of knowledge and high cost, was not enough to motivate action. For example, the

Arab oil embargo of 1973 changed peoples' attitudes about energy consumption, and many researchers and government agencies believed that if given the appropriate information, Americans would take action to use less energy (Gardner & Stern, 1996). U.S. gas and electric companies distributed information in monthly bills about easy, low-cost measures to conserve energy and save money. Surprisingly, monitoring the energy consumption in these study and control groups revealed no significant changes (Gardner & Stern, 1996). In this case, the utility companies and government agencies saw only one obstacle that was hindering action to conserve energy- knowledge about ways to make changes. Therefore, the companies and agencies thought that removing this obstacle would motivate action. What they did not consider were other factors that might help influence the public. For example, although the public may have been interested in the information, they were not motivated to use less energy (Gardner & Stern, 1996).

Garner and Stern (1996) have studied public participation programs like the one following the Arab oil embargo in combination with other more successful programs, in order to provide suggestions for more effective methods of providing information to the public. One suggestion included using a credible source that the public trusts, such as a state utility regulatory commission or a local interest group to provide the information. Other techniques included providing personalized information that catches the public's attention (e.g., specific data on community water use) or providing identifiable examples of positive environmental actions (Gardner & Stern, 1996).

Similar case studies also showed that people react differently to different types of materials and communication. For example, some communities respond better to a personal letter from local public officials, and others respond better to direct communication in person. These and other case studies presented above exemplify that effective public involvement and education programs are unique to each community. Designing such a program involves learning

more about community needs and perceptions about the issue and using multiple approaches to provide information and motivate action (Gardner & Stern, 1996).

*Surveys.* Surveys are an important first step in an involvement and education program and help determine community needs, reveal barriers to action, and evaluate and guide program development. For example, the case study by Tran et al. (2002) presented above revealed the advantages of a survey of public attitudes and perceptions in developing a community water resource plan. The survey results highlighted important factors about the community that were playing a role in their knowledge and attitudes about the local environment. Public attitudes toward water quality and development in the area were based on misunderstandings and misinformation about human impacts on the environment. Many community members were concerned about development issues in the area and were willing to participate in long-term monitoring and conservation programs. In addition, community members prefer conservation and preservation programs on the island rather than urbanization and tourist development. The results from this community survey provided useful information that served as the basis for a public education and participation plan (Tran et al., 2002).

Cobourn (1999) provided an example of a public survey in the Truckee River System that revealed several barriers to large-scale public participation in a water quality management plan. The original plan for this system included coordinating all of the efforts of the individual watershed education and protection groups into designing one watershed management plan. Barriers that these watershed groups expressed about such a large-scale plan included too many people and opinions hindering agreement on one plan, too much time and effort causing people to lose interest, and too many different interests leading to a generic plan. In conclusion, the watershed groups decided not to develop one large plan, but to continue their individual efforts, to communicate their progress, and to work toward developing a long-term goal for the watershed (Cobourn, 1999).

Cobourn (1999) also provided examples of programs that used surveys to evaluate public involvement and education programs. The Small Ranch Water Quality Program in the Truckee River watershed involved volunteers who monitor the effects of Best Management Practices (BMPs) on water quality. The volunteers also built BMP demonstration sites and taught others how to participate in the program. Pre and post survey results reveal the effectiveness of the program in increasing participants' understanding of BMPs. In a different case study, a telephone survey revealed the effectiveness of a Storm Drain Stenciling Program in the Truckee River watershed. Survey results showed that more survey respondents who saw the storm drain stencils, compared to those who did not, knew that storm water goes into streams and rivers after it enters the storm drain (Cobourn, 1999).

As the case studies of Cobourn (1999) and Tran et al. (2002) demonstrate, surveys are important first steps in developing public involvement and education programs. Surveys are also useful in evaluating the effectiveness of existing programs. Cobourn (1999) and Tran et al. (2002) and other case studies (Gardner & Stern, 1996; Letey, 1999; Moorhouse & Elliff (2002); Tran et al., 2002) also demonstrate the benefits of other components in public involvement and education programs. Below is a review of the case of the snail darter and Tellico dam in Tennessee. The snail darter case also demonstrates the importance of public participation, but in this case, conflicts of public interest lead to devastating results.

*Lessons learned from the case of the snail darter and Tellico dam.* In 1975, the snail darter, *Percina (Imostoma) tanasi*, was federally listed as an endangered species after being discovered only a couple of years earlier. At the same time of the darter's discovery, the construction of the Tellico dam on the Little Tennessee River was underway. When a scientist discovered the snail darter, he also learned that a large portion of the population resided in a section of the Little Tennessee River that was to become the Tellico Dam Reservoir. The completion of this dam would most likely eliminate this population of the snail darter as well as

its critical habitat (habitat that is designated by the FWS as critical to the survival of the species) (USFWS, 2003).

In 1976, stakeholders in the Little Tennessee River area (e.g., farmers, sportsmen, archaeologists and representatives of the Cherokee Nation) sued the Tennessee Valley Authority (TVA) in order to halt construction of the Tellico Dam because it was in violation of the Endangered Species Act (ESA). The District Court ruled that the project was 80% complete, had acquired millions of dollars in congressional funds, and therefore should continue to completion (Weinsoff & Kross, 1994).

The case then went to the Court of Appeals and the Supreme Court, and TVA was ordered to stop all construction despite their efforts to save the darter by relocation. The Supreme Court ruled that Section 7 of the ESA prohibits federal projects that harm endangered species and is very clear in its legislation. The Supreme Court stated that under federal law endangered species have the highest priority (USFWS, 2003; Weinsoff & Kross, 1994).

After the Supreme Court ruling, two state senators recommended the formation of a committee known as the “God-squad,” who would review cases like the Tellico Dam. In these cases, the committee could rule that “no “reasonable and prudent” alternative exists, where the project is of national significance, or where the benefits of building it “clearly outweigh” any other course of action” (Reisner, 1993, p. 327). Surprisingly to many, especially the two senators who formed the committee, the “God-squad” reviewed the snail darter and Tellico dam case and ruled for the darter for economic reasons. One member of the committee suggested that the costs of finishing the dam, which was 95% complete by this point, did not justify the losses that would incur, such as economic losses associated with loss of farm property (Reisner, 1993, pp. 324-329).

Once again as a surprise to many, soon after these decisions were made, a Senator and a Congressman from Tennessee cleverly slipped a provision passed Congress that exempted the Tellico Dam project from the legislation of the ESA or other relevant laws. Consequently, the

snail darter and its critical habitat in that part of the Little Tennessee River were eliminated (USFWS, 2003; Weinsoff & Kross, 1994). In addition the dam caused the loss of valuable farmland and many archeological sites (Reisner, 1993, pp. 324-329).

In the snail darter case, the stakeholders recognized the importance of the health of the Little Tennessee River and its aquatic species. Many also understood that Tellico dam would have minimal benefits to the public interest. Tellico dam would provide a minimal increase in power to a nearby dam, and would not produce any benefits in flood control (as many dams do). Tellico dam would also result in minimal to no benefits to recreation and fish and wildlife in the area (Reisner, 1993, 324-329). The interest of those who did not want TVA to finish the dam was strong enough to win a case in the Court of Appeals and the Supreme Court, but in the end their efforts were ignored. Better planning and more public involvement in the dam project could have alleviated some of the damage to the river and the endangered species. For example, if the local government officials had worked with the public earlier in the process, before the construction of the dam, perhaps other options to the reservoir would have been realized (see Moorhouse & Elliff, 2002). This case is one of many environmental disasters that result from insufficient planning or not considering all options and not looking into the future (see Letey, 1999). Public involvement and education programs that are part of environmental planning and addressing environmental issues can help to alleviate some of these problems.

### *Summary*

In this Chapter I have presented case studies that demonstrate the importance of public involvement and education programs in addressing environmental issues. A review of the literature supports several components of effective public involvement and education programs. These components include knowledge about the local environment and relevant issues, communication among all key players, public participation in the issues, multiple approaches and opportunities for education and participation, and surveys as an initial step to developing a program.

Understanding the components of effective public involvement and education programs helps in developing program for the Etowah watershed. The Etowah public environmental survey is designed as a first step to learn more about public knowledge, opinions, and sense of empowerment regarding the Etowah River and environmental issues. The results from the survey will guide the development of the Etowah program by providing insight into the interests and needs of the Etowah watershed community. In Chapter 3, I present the methods used in developing and implementing the Etowah public environmental survey, including the content and format of the survey questions, and the design or type of survey conducted.

## CHAPTER 3

### METHODOLOGY

The objectives of the Etowah HCP public involvement and education program included conducting a survey to determine the knowledge, opinion, and sense of empowerment of residents in the watershed toward the Etowah River and local environmental issues. The Etowah survey will contribute to the broader goal of the Etowah public involvement and education program to increase awareness and stewardship across the watershed, which includes encouraging support for policies and regulations that protect endangered species and the health of the Etowah River. In this chapter, I describe the procedures used in developing the Etowah survey. I discuss the survey contents, design, review and implementation. The full survey, as given by the interviewers, is presented in Appendix B.

#### *Survey Content*

In developing the Etowah public environmental survey, I worked closely with an interdisciplinary group of people with a variety of expertise in survey development, education, psychology, and ecology. The development and implementation of the survey was a joint effort of the University of Georgia (UGA), The Nature Conservancy, the A.L. Burruss Institute of Public Service at Kennesaw State University (KSU), Limestone Valley RC&D, and the Upper Etowah River Alliance.

Our first task was to determine the survey topics. The survey topics were guided by the objective of the Etowah HCP public involvement and education program: to learn more about public knowledge, opinion, and sense of empowerment. Knowledge, opinion and sense of empowerment are important components of an involvement and education program in motivating public participation in environmental issues (Hudson, 2001; Hungerford and Volk,

1990; Lubencho, 1998). The following is a description of these three components and how they are incorporated with the survey topics into the survey questions.

*Knowledge* is “the fact or condition of knowing something with familiarity gained through experience or association” (Webster’s new collegiate dictionary, Woolf, 1973, p. 633). Those who are knowledgeable about their local environment are more likely to take action. The Etowah public environmental survey items target public knowledge about water quality, biodiversity and endangered species in the Etowah River, threats, issues and needs in the Etowah watershed, and laws and regulations relative to endangered species and development.

*Opinion* is “a view, judgment, or appraisal formed in the mind about a particular matter” (Webster’s new collegiate dictionary, Woolf, 1973, p. 798). A person’s opinion is based on many factors, such as socioeconomic background, knowledge, and general surroundings and personal experiences. Opinion may also reflect attitude, and a person’s opinion toward an environmental issue can strongly affect willingness or desire to take action (Gardner & Stern, 1996; Tran et al., 2002). Our survey questions focus on public opinion about development in the watershed, public education, water quality, and policies regarding habitat and species protection.

*Empowerment* is an individual’s belief in his or her responsibility and capability to act on a particular issue, and includes perception of knowledge and skill in taking action, locus of control, and intention to act (Hungerford & Volk, 1990; see also Hudson, 2001). A person who is empowered has the confidence and knowledge to take action. Survey items targeting the public’s sense of empowerment in the Etowah watershed focus on level of involvement in the community, limitations to involvement, level of responsibility to inform community members and participate in watershed issues, and confidence in ability to make a difference.

Our understanding of these components and their importance in our education program guided the development of the survey topics and questions. The survey topics also address the needs in the Etowah watershed regarding endangered species and the health of the Etowah

River. The survey topics include the Etowah River and its endangered species, development in the watershed, education and involvement in the community, and policies regarding development and aquatic species protection.

### *Survey Design*

After determining the topics of the Etowah survey, we focused on the survey design, which includes the type of survey and format of the questions. Our choices for the type of survey to conduct included a telephone survey, a written questionnaire, or personal interviews. The following is a comparison of these types of surveys, explaining our decision to conduct a telephone survey for our project.

Telephone surveys in comparison to written questionnaires, typically generate a higher response rate, 50-60% and 20-30% respectively, and ensure a true representative sample; whereas written questionnaires do not (Terry Sloope, A.L. Burruss Institute of Public Service, Kennesaw State University, personal communication, April, 2001). For example, in a written survey, the number of people who finish and return the questionnaire determines the total number of respondents. On the other hand, with telephone surveys, phone numbers are continuously sampled until the desired number of respondents is reached. Phone surveys are also more appropriate than written surveys for knowledge questions. In written surveys the respondent has the opportunity to use outside sources for answers (Mertens, 1998). Finally, in comparison to personal interviews, telephone surveys generate a lower response rate, but are much less time and resource consuming (Groves & Kahn, 1979).

The decision to conduct a telephone survey helped in determining the style and format of the survey questions. Questions for telephone surveys need to be easily understood, with simple format and vocabulary. I used a variety of resources in writing the survey questions. My experiences in environmental education and the Etowah watershed helped in translating the general survey topics to appropriate questions for the public. Co-workers in the HCP Advisory Committee provided comments on question format and content, and suggestions on how to

more effectively address our survey topics and components. In addition, reviewing other environmental surveys with goals similar to the Etowah survey helped in determining the appropriate language and vocabulary for survey items. These surveys include the Soque River Watershed Association/Upper Chattahoochee Riverkeeper drinking water survey (Kristin Costley, Upper Chattahoochee Riverkeeper, personal communication, 2002), the Lady Bird Johnson Wildflower Center Survey of Environmental Attitudes (retrieved 2001 from the Lady Bird Johnson Wildflower Center website, <http://www.wildflower.org>), and the Bartow County Watershed Assessment and Summary of Public Opinion (Terry Sloope, A.L. Burruss Institute of Public Service, KSU, personal communication, April, 2001).

The final format of the Etowah survey is an adult telephone survey that consists of 26 survey questions plus nine demographic questions. Each question is multiple-choice, Likert-type scale, or yes and no format, and some questions have more than one component. The survey begins with a brief introduction about the purpose of the survey, the importance of the respondents' participation to the community, and the confidentiality of the responses. The first few questions in the survey are general, focusing on education and interest in policy in the Etowah watershed. The remainder of the survey addresses more specific topics and issues in the Etowah watershed related to water quality and development (see Appendix B for the survey).

#### *Survey Review and Implementation*

In addition to the above resources used in developing the survey, I also conducted a survey review process with co-workers and peers not involved with the Etowah HCP. The reviewers read each question for vocabulary, grammar, ease of understanding, and effectiveness in covering the survey topics and components. After incorporating their comments into the survey questions, I submitted the survey to the A.L. Burruss Institute of Public Service, KSU for review. The KSU survey department provided a professional, unbiased opinion on question format, content, and length for the final draft of the survey.

In order to conduct the survey, we submitted an application and received approval from the Institutional Review Board (IRB) at UGA for conducting research with human research participants (see Appendix C for the application and approval forms). The A.L. Burruss Institute of Public Service at KSU received IRB approval from their institution as well. KSU implemented the survey using a randomly generated list of telephone numbers provided by Survey Sampling, Inc., of Fairfield, Connecticut. The telephone numbers were screened to avoid unsuitable numbers (such as pay phones, disconnected numbers, and businesses) and were chosen from the 11 counties of the Etowah watershed: Bartow, Cherokee, Cobb, Dawson, Floyd, Forsyth, Fulton, Lumpkin, Paulding, Pickens, and Polk Counties. Each number was called no more than 10 times in attempt of an interview. If more than one adult resided in a household, a random selection process was used to maintain the randomness of the sample. Answers to the survey questions were paper-coded as respondents answered the items. KSU provided the frequency data for the survey results and a written report with graphs, charts, and tables representing the responses.

KSU provided the frequency data for the entire watershed as well as for the Upper and Lower Etowah watersheds. The Etowah watershed is divided by Lake Allatoona, which is located close to the middle of the watershed (see map in Appendix A). The counties located upstream, or approximately northeast of the lake, comprise the Upper Etowah, and those downstream, or approximately southwest of the lake, comprise the Lower Etowah (see Table 4.1 for the counties in each of these sections of the Etowah watershed).

### *Summary*

The purpose of the Etowah public environmental survey is to lay the groundwork for the Etowah HCP public involvement and education program. This chapter provides a framework for the methodology of this study. Developing the Etowah survey began with determining the survey content, including the survey topics and components, and deciding how to incorporate these into the survey. Next, we used a variety of resources to determine the most appropriate

type of survey to conduct and the format and style of the questions. We combined all of these factors and developed survey questions that are consistent with the goals of the Etowah HCP and the Etowah public involvement and education program. Finally, we received and incorporated feedback into the survey, and KSU implemented the survey. In Chapter 4, I provide the survey results based on the frequency data provided by KSU.

## CHAPTER 4

### RESULTS

The Etowah River Basin Survey concluded with 1107 completed interviews, 405 from the Upper Etowah and 702 from the Lower Etowah. The average interview time was 14.5 minutes. Figure 4.1 represents the distribution of respondents amongst the 11 counties in the watershed. The population in the Etowah watershed is 2,074,464, with 326,273 in the Upper Etowah and 1,748,191 in the Lower (see Table 4.1). The results from the demographics and survey questions are presented below, with comparisons between the Upper and Lower Etowah responses where substantial differences are apparent. The survey results are represented in tables and figures in *Demographics Results* and *Survey Question Results* sections at the end of this chapter.

#### *Demographics*

The age of the respondents for the watershed ranged from 18 to 92, with a mean age of 47 (see Table 4.2), and there were slightly fewer male respondents than female, 44.9% and 55.1%, respectively (see Table 4.3). The reported races from the Lower Etowah were slightly more diverse than the Upper Etowah. The majority of the Lower Etowah respondents were Caucasian, 86.4%, with other races including African-American, 5.6%, Native American, 2.3%, and Hispanic, 1.6%. In comparison, the Upper Etowah respondents were 92.8% Caucasian, 0.7% African-American, 2.7% Native American and 0.5% Hispanic (see Table 4.4).

The reported unemployment rate for the all respondents was 3.3%. More respondents in the Lower Etowah are employed full-time outside the home, 54%, and retired or retired on disability, 21.2%, than respondents in the Upper Etowah, 50.4% and 18.1%, respectively. In

comparison, more respondents in the Upper Etowah reported to be self-employed, 11.2% compared to 6.3% from the Lower Etowah (see Table 4.5 and Figure 4.2).

More respondents from the Upper Etowah received some college education, 24.6%, or a BA or BS, 26.6%, than the Lower Etowah, 21.5% and 20.1%, respectively. In addition, 30.2% of the Upper Etowah respondents compared to 25.6% of the Lower Etowah respondents reported having a high school diploma. On the other hand, more respondents in the Lower Etowah reported having technical or trade school training, 6.8%, than the Upper Etowah, 3.5% (see Table 4.6 and Figure 4.3).

When asked about annual income, many respondents refused, 10.9% Upper and 12.4% Lower, respectively. More respondents from the Lower Etowah reported to have a lower annual income ranging from \$25K-\$75K, 46.3% compared to 39% in the Upper. On the other hand, more respondents from the Upper Etowah reported to have a higher annual income of \$75K-Over \$150K, 32% compared to 24% in the Lower (see Table 4.7 and Figure 4.4).

#### *Survey Questions*

When asked about the effectiveness of particular methods of providing information about issues related to the Etowah Watershed, more respondents indicated that the methods were somewhat or not effective, with the exception of television and radio announcements. Respondents more often rated television and radio, 43.7%, and education in schools, 37.8%, as very effective and email, 51.5%, public meetings, 49.6%, and signs, 47.7%, as not effective (see Table 4.11 and Figure 4.5). When asked about the most effective method of this type of communication, more respondents indicated television and radio announcements than other methods, 36.4% Upper Etowah and 36.9% Lower Etowah. Upper and Lower Etowah respondents differed somewhat in their opinions about other methods of communication. Upper Etowah respondents were more likely to choose personal email, 16.2% compared to 12.0% from the Lower Etowah, and Lower Etowah respondents were more likely to choose education in schools, 14.4% compared to 11.5% from the Upper Etowah (see Table 4.12 and Figure 4.6).

The majority of all respondents in the watershed, 92.6%, reported being interested<sup>1</sup> in public policy (see Table 4.13). More respondents from the Upper Etowah, 91.8%, reported participating in various activities to influence public policy, as compared to 66.5% from the Lower Etowah. Regarding the particular activities, more respondents reported writing a letter or signing a petition than other activities, 37.5% and 23.7% from the Upper Etowah compared to 28.5% and 19.9% from the Lower, respectively (see Table 4.14 and Figure 4.7).

The majority of respondents from the Etowah watershed, 92.8%, are not active in any environmental organizations. When respondents did indicate involvement in an organization, 6.1% reported being involved in organizations that were not listed in the survey, 0.9% reported the Nature Conservancy of Georgia, and 0.8% reported Georgia Wildlife Federation (see Table 4.15). When asked about obstacles to being involved in improving environmental conditions, respondents most often indicated lack of time, 53.0%, and lack of information about how to get involved, 20.9% (see Table 4.16 and Figure 4.8).

The majority of respondents, 95.1%, agree<sup>2</sup> that everyone in the community must make an effort to preserve the rivers and streams of the Etowah. In addition, 95.1% agree that the actions of people who live upstream in the Etowah watershed can have a serious impact on the water quality downstream (see Tables 4.17 and 4.18, respectively). Similarly, 79.5% agree that it is their responsibility to educate others about the impacts of their activities on the water quality of the Etowah (Table 4.19).

Although most respondents, 71.6% from the Upper Etowah and 66.5% from the Lower, were aware that they live near the Etowah River Basin (see Table 4.20), many indicated that they do not know the source of their drinking water, 20.2% from the Upper Etowah and 33.6% from the Lower. Most of the respondents from the Upper Etowah who did report a drinking water source reported Lake Lanier, 22.0%, groundwater, 21.0%, and the Etowah River, 19.0%. The

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<sup>1</sup> 'Interested' refers to responses of both 'very interested' and 'somewhat interested.'

<sup>2</sup> 'Agree' refers to respondents answering "Strongly agree" and "Agree."

majority of respondents from the Lower Etowah reported Lake Allatoona, 18.1%, sources not listed in our survey, 14.2%, and groundwater, 13.5% (see Table 4.21 and Figure 4.9).

The majority of respondents, 91.0%, agree that the diversity of fish and other aquatic life is essential to the health of the Etowah River Basin (see Table 4.22). In addition, 92.0% of the respondents agree that local governments should restrict development to protect fish and other aquatic life. The majority of respondents, 87.8%, also agree that buffer areas along streams and rivers are important to protect the aquatic life (see Tables 4.23 and 4.24, respectively). On the other hand, more respondents from the Upper and Lower Etowah, 61.3% and 54.3%, respectively, indicated that some damage to rivers and streams is an acceptable cost of economic growth (see Table 4.25).

When asked if continued urban and suburban expansion is essential to the economic well being of the region, respondents were less divided as to whether they agree or disagree, and the Upper and Lower Etowah had differing opinions. More respondents from the Lower Etowah agree with this statement, 50.8% compared to 41.7% who disagree; and more respondents from the Upper Etowah disagree, 49.3% compared to 43.0% who agree (see Table 4.26). Many respondents, 48.3%, did not agree that the Endangered Species Act is too restrictive to landowners, and 18.2% indicated that they do not know (see Table 4.27). On the other hand, 60.8% of the respondents believe that restrictions on private property are a violation of property rights (see Table 4.28).

More than 84% of the respondents supported<sup>3</sup> all of the policy suggestions to protect the Etowah River and aquatic species and their habitat. The Upper and Lower Etowah respondents were in agreement for most of these policies, with the exception of mandatory maintenance or inspection of septic systems to reduce water pollution, in which more respondents from the Lower Etowah, 88.4%, indicated more support than the Upper, 84.2%. The policies that respondents supported most often include regulations to control stormwater run-off and protect

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<sup>3</sup> 'Support' refers to responses of both "very supportive" and "somewhat supportive."

the water quality of the river basin, 92.6%, and a regional development plan that both protects endangered species' habitat and allows for future growth, 91.9%. The policy that gained the least support, relative to the other policies, was increasing the size of buffer areas along the streams and rivers of the Etowah, 85.3% (see Table 4.29). In addition to supporting the suggested policies to protect the Etowah, the majority of respondents, 64.9% Upper and 72.6% Lower, believe that the most important reason to protect water quality of the Etowah is to protect drinking water (see Table 4.30 and Figure 4.10).

Regarding environmental policy in the Etowah watershed, more respondents believe that this should be the responsibility of the state, 38.3% Upper and 34.6% Lower, or local government, 27.9% Upper and 25.2% Lower. In addition, more respondents from the Lower Etowah, 17% compared to 11.4% from the Upper Etowah, indicated that the Federal government should be responsible. Several respondents, 19.0% Upper and 19.9% Lower,<sup>4</sup> also indicated the responsibility to be a particular combination of these governments (see Table 4.31 and Figure 4.11). When asked about organizations responsible for monitoring and long-range plans to protect the Etowah, the majority of respondents, 83.5%, were not aware of any such organizations. Those who did indicate an organization more often listed one not given in the survey, 4.7%, or the Environmental Protection Agency, 4.2% (see Table 4.32).

Respondents were more likely to rate particular threats to the water quality of the Etowah as very serious, with the exception of erosion and sedimentation, stormwater runoff, and fertilizer from yards and lawns (see Table 4.33 and Figure 4.12). Threats that respondents often rated as very serious include industrial waste, 83.5%, discharge from wastewater treatment plants, 63.2%, leaking septic tanks, 59.2%, and trash left by visitors, 58.0%. In addition, stormwater runoff was more often rated not serious than any other threats listed, 24.8%. The majority of respondents, 58.3%, rated industrial waste as the most serious threat to the water quality of the Etowah. In addition, respondents were least likely to indicate stormwater

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<sup>4</sup> Values represent the total responses for various combinations of the governments.

runoff as the most serious threat, 1.9% (see Table 4.34 and Figure 4.13). When asked if some special interest groups exaggerate the threats to the water quality of the Etowah, more respondents agreed, 49.4%, than disagreed, 33.3%, and many indicated that they do not know, 14.4% (see Table 4.35).

Respondents from the Upper and Lower Etowah had slightly differing opinions on the water quality of the Etowah River, although many, 23.7% and 23.2%, respectively, indicated that they do not know. Few respondents indicated that water quality is excellent or very good, and respondents from the Upper Etowah were more likely to indicate that the water quality is good, 29.9% compared to 24.6% from the Lower (see Table 4.36 and Figure 4.14). When asked about the future of the Etowah River, more respondents indicated that the water quality will get worse, 67.3%, rather than better,<sup>5</sup> 20.4% (see Table 4.37 and Figure 4.15).

### *Summary*

In this chapter, I presented the results from the Etowah public environmental survey. The values given represent the frequency data obtained from the A.L. Burruss Institute of Public Service at Kennesaw State University. I provide responses from the entire Etowah watershed as well as different responses from the Upper and Lower Etowah, when appropriate. Members of the Etowah HCP Advisory Committee and stakeholders in the Etowah watershed will use these survey results to guide the development of the Etowah public involvement and education program. In Chapter 5, I discuss the implications of these survey results and provide recommendations for the Etowah program, including science and environmental education in schools.

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<sup>5</sup> 'Worse' and 'better' includes responses of both 'a little bit' and 'a whole lot.'

## Demographic Results Tables

<i>Table 4.1. County residence</i>		
Lower Etowah Watershed		
County	% All	Population
Bartow	14.8	80,026
Cobb	6.2	631,767
Floyd	11.3	91,183
Fulton	8.9	816,638
Paulding	14.8	89,734
Polk	7.3	38,843
Upper Etowah Watershed		
County	% All	Population
Cherokee	15.5	152,170
Dawson	2.6	17,176
Forsyth	13.2	110,296
Lumpkin	2.8	21,855
Pickens	2.4	24,776

*Note.* Percentages represent the percent of the total number of respondents. The population for the entire Etowah watershed is 2,074,464 (see Figure 4.1). (Population data are 2001 estimates, retrieved from <http://quickfacts.census.gov/qfd/states/>, October, 2003.)

<i>Table 4.2. Age</i>			
Responses	% Upper	% Lower	% All
17	0.0	0.1	0.1
18	0.0	0.6	0.4
19	0.8	0.7	0.8
20	0.3	1.5	1.0

21	0.8	1.2	1.0
22	0.0	1.2	0.8
23	1.3	0.9	1.0
24	1.0	1.2	1.1
25	0.5	1.5	1.1
26	1.5	1.2	1.3
27	2.3	0.6	1.2
28	1.3	1.6	1.5
29	0.3	1.6	1.1
30	1.5	2.1	1.9
31	2.0	1.5	1.7
32	1.5	1.3	1.4
33	2.3	2.8	2.6
34	1.8	1.2	1.4
35	1.8	2.2	2.1
36	2.6	2.5	2.5
37	2.6	2.2	2.3
38	2.8	2.2	2.4
39	4.1	2.5	3.1
40	2.3	2.7	2.5
41	1.8	1.9	1.9
42	2.3	2.4	2.3
43	3.8	3.4	3.6
44	2.3	2.5	2.4
45	2.3	3.1	2.8
46	1.5	2.8	2.3
47	2.8	1.5	2.0
48	2.0	1.5	1.7
49	2.0	1.0	1.4
50	2.6	1.6	2.0
51	2.0	2.1	2.1
52	4.3	2.7	3.3
53	2.0	2.1	2.1
54	4.3	1.9	2.8
55	1.0	3.3	2.4
56	1.3	1.5	1.4
57	1.5	2.2	2.0
58	2.3	1.5	1.8
59	1.8	1.3	1.5
60	1.8	1.8	1.8
61	1.0	1.5	1.3
62	2.0	1.2	1.5
63	1.8	1.0	1.3
64	2.0	0.6	1.1
65	0.3	1.3	0.9
66	1.0	0.7	0.8
67	0.0	1.0	0.7
68	0.5	2.1	1.5
69	0.3	0.4	0.4
70	1.3	1.3	1.3
71	0.5	0.4	0.5

72	0.3	1.0	0.8
73	1.0	0.9	0.9
74	0.8	0.4	0.6
75	0.8	1.0	0.9
76	0.8	0.7	0.8
77	0.8	1.3	1.1
78	0.8	0.3	0.5
79	0.3	0.6	0.5
80	0.8	0.3	0.5
81	0.3	0.3	0.3
82	0.0	0.4	0.3
83	0.5	0.1	0.3
84	0.5	0.6	0.6
85	0.3	0.0	0.1
86	0.3	0.1	0.2
87	0.0	0.1	0.1
88	0.0	0.1	0.1
89	0.0	0.3	0.2
90	0.0	0.0	0.0
91	0.0	0.0	0.0
92	0.0	0.0	0.0
93	0.0	0.1	0.0

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*Table 4.3. Gender*

Gender	% Upper	% Lower	% All
Male	42.4	46.4	44.9
Female	57.6	53.6	55.1

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*Note.* Gender was determined by the interviewer.

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*Table 4.4. Race*

Responses	% Upper	% Lower	% All
African-American	0.7	5.6	3.8
Hispanic	0.5	1.6	1.2
Caucasian	92.8	86.4	88.8

Asian, or...	0.2	0.6	0.5
Native American	2.7	2.3	2.5
(Respondent offers) Multi-racial	0.2	0.6	0.5
(Respondent offers) Other	0.5	1.2	0.9
DK/NA	2.2	1.7	1.9

*Table 4.5. Employment*

Responses	% Upper	% Lower	% All
A full time "homemaker"	8.7	9.1	8.9
Employed full-time outside the home	50.4	54.0	52.6
Employed part-time outside the home	6.7	5.3	5.8
Self-employed	11.2	6.3	8.1
Unemployed, or...	4.0	2.9	3.3
Retired	17.9	18.2	18.1
(Respondent offers) Retired on disability	0.2	3.0	2.0
DK/NA	1.0	1.2	1.1
<i>Total retired</i>	<i>18.1</i>	<i>21.2</i>	<i>20.1</i>

*Note.* Percent in italics represent a combination of responses indicated (see Figure 4.2).

*Table 4.6. Education*

Responses	% Upper	% Lower	% All
Grades 1-11 (did NOT graduate High School)	7.4	9.5	8.8
11 or 12 <sup>th</sup> grades (DID graduate from high school)	25.6	30.2	28.5
Technical/trade schooling*	3.5	6.8	5.6
Some college (did NOT receive a BA or BS)	24.6	21.5	22.6
College Graduate (BA or BS)	26.6	20.1	22.4
Graduate/Professional School (MA, MS, Ph.D., JD, MD, etc.)	10.7	11.0	10.9
Refused	1.0	0.6	0.7
DK/NA	0.7	0.4	0.5

*Note.* See Figure 4.3.

*Table 4.7. Income*

Level of income	% Upper	% Lower	% All
Under \$15,000	4.2	4.9	4.7
\$15K - \$25K	8.4	7.5	7.8
\$25K - \$50K	19.4	25.5	23.3
\$50K - \$75K	19.6	20.8	20.3
\$75K - \$100K	15.1	13.0	13.8
\$100K - \$150K	10.2	7.2	8.3

Over \$150K	6.7	3.8	4.8
Refused	10.9	12.4	11.9
DK/NA	5.5	4.9	5.1
<i>Total \$25K-75K</i>	<i>39.0</i>	<i>46.3</i>	<i>43.6</i>
<i>Total \$75K-Over \$150K</i>	<i>32.0</i>	<i>24.0</i>	<i>26.9</i>

Note. Percents in italics represent a combination of responses indicated (see Figure 4.4).

*Table D8. Dwelling*

Responses	% Upper	% Lower	% All
An apartment	5.0	6.6	6.0
A condominium, duplex, or other multi-family dwelling	0.7	2.2	1.6
A mobile home, or...	7.4	4.6	5.6
A single-family house	85.9	85.8	85.8
(Respondent Offers) Other... (specify)	0.5	0.3	0.4
DK/NA	0.5	0.6	0.5

*Table 4.9. Own or rent*

Own/rent	% Upper	% Lower	% All
Own	88.6	83.1	85.1
Rent	10.2	15.6	13.6
DK/NA	1.2	1.3	1.3

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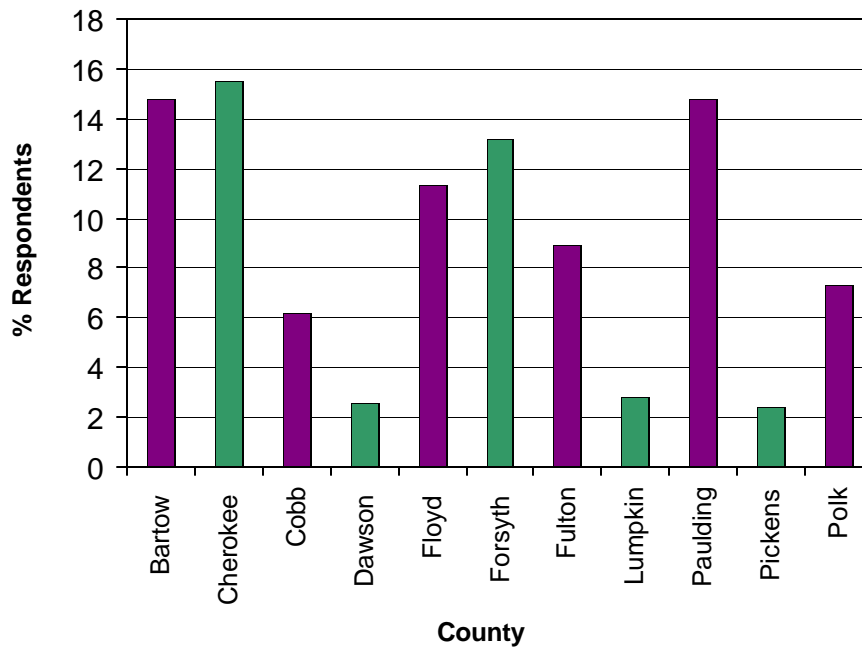
*Table 4.10. Residence*


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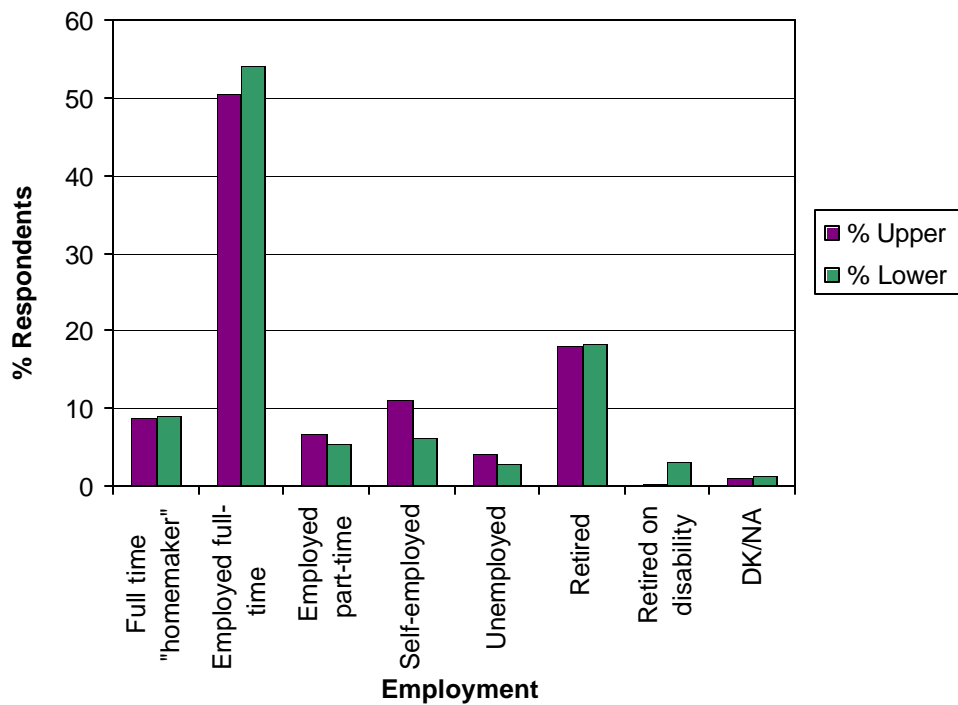
Responses	% Upper	% Lower	% All
0	5.7	4.6	5.0
1	10.0	10.4	10.2
2	9.0	8.7	8.8
3	11.0	7.8	9.0
4	6.0	6.4	6.2
5	6.0	7.2	6.8
6	6.5	6.5	6.5
7	4.2	3.3	3.7
8	3.7	3.0	3.3
9	1.5	2.2	1.9
10	5.0	4.3	4.6
11	2.0	1.6	1.7
12	4.5	3.8	4.0
13	1.2	0.7	0.9
14	0.7	1.2	1.0
15	2.0	2.7	2.5
16	2.0	2.3	2.2
17	0.7	1.6	1.3
18	1.0	1.0	1.0
19	1.2	0.7	0.9
20	2.2	3.6	3.1
21	0.0	1.0	0.6
22	1.5	1.2	1.3
23	0.7	1.0	0.9
24	1.2	0.7	0.9
25	2.5	1.4	1.8
26	0.0	0.1	0.1
27	0.7	0.7	0.7
28	0.5	0.7	0.6
29	0.0	0.4	0.3
30	1.0	2.5	1.9
31	0.0	0.1	0.1
32	0.5	0.4	0.5
33	1.0	0.7	0.8
34	0.0	0.4	0.3
35	0.2	0.4	0.4
36	0.0	0.0	0.0
37	0.0	0.4	0.3
38	0.2	0.3	0.3
39	0.0	0.0	0.0
40	0.2	1.0	0.7
41	0.2	0.4	0.4
42	0.5	0.1	0.3
43	0.2	0.0	0.1
44	0.2	0.0	0.1
45	0.2	0.1	0.2
46	0.0	0.1	0.1
47	0.2	0.0	0.1

48	0.0	0.3	0.2
49	0.0	0.0	0.0
50	0.2	0.4	0.4
51	0.0	0.0	0.0
52	0.5	0.1	0.3
53	0.0	0.1	0.1
54	0.0	0.0	0.0
55	0.0	0.1	0.1
56	0.0	0.0	0.0
57	0.2	0.1	0.2
58	0.0	0.0	0.0
59	0.2	0.0	0.1
60	0.2	0.1	0.2
61	0.0	0.0	0.0
62	0.0	0.0	0.0
63	0.0	0.0	0.0
64	0.0	0.0	0.0
65	0.0	0.0	0.0
66	0.0	0.0	0.0
67	0.0	0.0	0.0
68	0.0	0.0	0.0
69	0.0	0.0	0.0
70	0.0	0.0	0.0
71	0.0	0.0	0.0
72	0.0	0.0	0.0
73	0.0	0.0	0.0
74	0.0	0.0	0.0
75	0.0	0.1	0.1
76	0.0	0.0	0.0
77	0.0	0.0	0.0
78	0.0	0.0	0.0
79	0.0	0.0	0.0
80	0.0	0.1	0.1

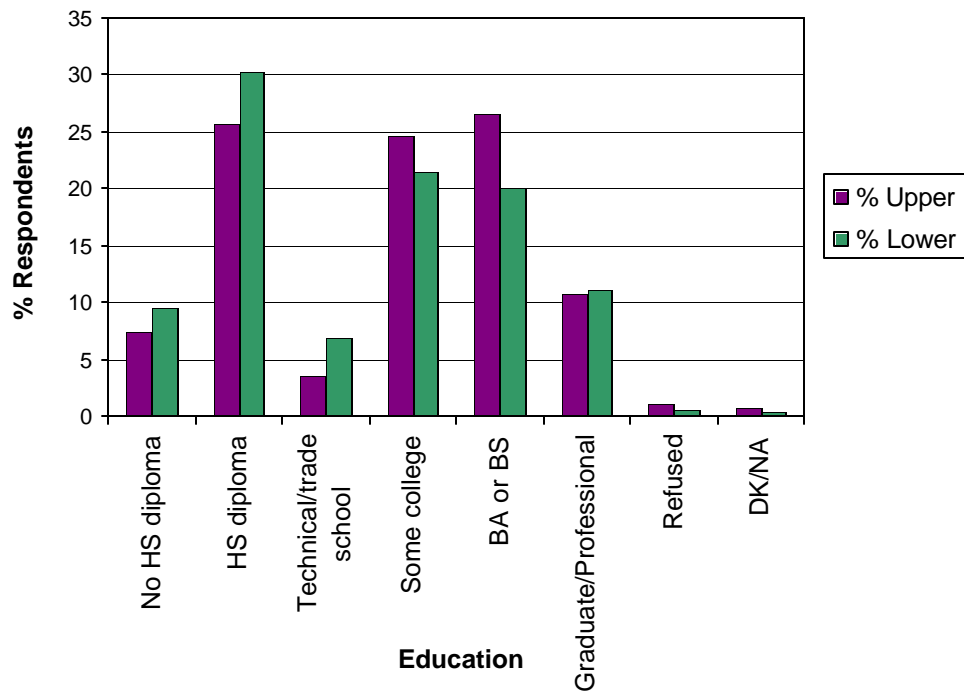
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*Demographic Results Figures*

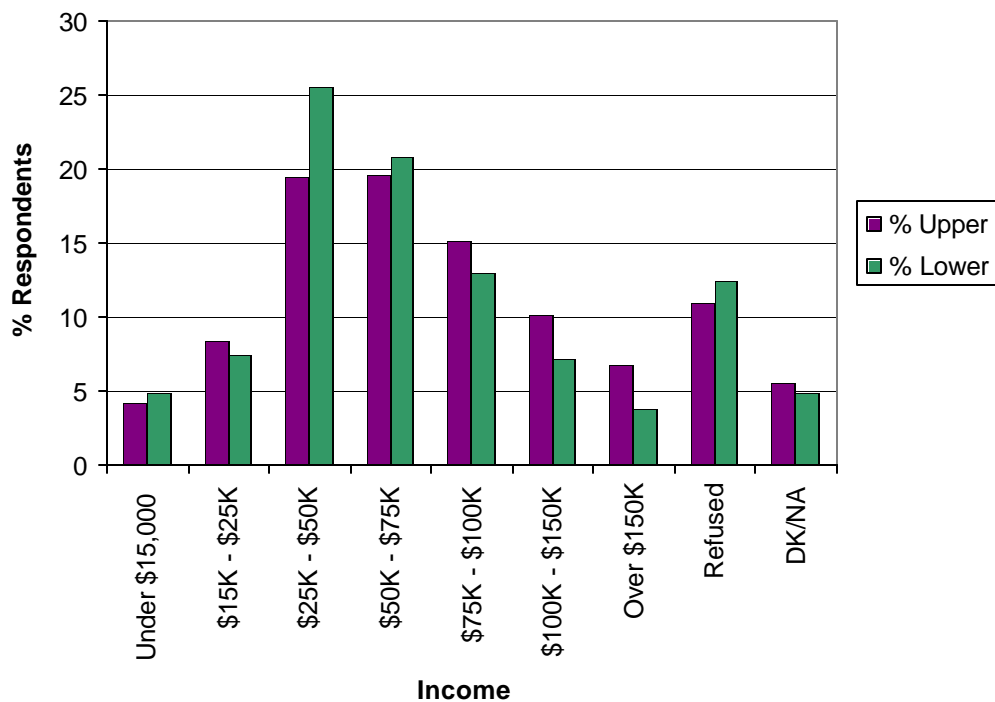
*Figure 4.1.* Distribution of respondents among the 11 counties of the Etowah watershed. Lower Etowah watershed counties are represented in blue and Upper Etowah watershed counties are represented in green (see Table 4.1).



*Figure 4.2.* Comparison of distribution of employment of Upper and Lower Etowah Respondents. The majority of respondents from both the Upper and Lower Etowah are employed full-time (see Table 4.5).



*Figure 4.3.* Comparison of the level of education of Upper and Lower Etowah respondents. The majority of all respondents received a high school diploma or have received some level of college education (see Table 4.6).



*Figure 4.4.* Comparison of the distribution of income of the Upper and Lower Etowah respondents. Many respondents refused to respond to this question. More respondents from the Lower Etowah reported to have a lower annual income ranging from \$25K-\$75K. On the other hand, more respondents from the Upper Etowah reported to have a higher annual income of \$75K-Over \$150K (see Table 4.7).

## Survey Question Results Tables

Table 4.11. Effectiveness of methods of communication

TV or Radio announcements			
Response	% Upper	% Lower	% All
Very effective	42.0	44.7	43.7
Somewhat effective	41.7	40.9	41.2
Not effective	15.3	13.8	14.4
DK/NA	1.0	0.6	0.7
Newspaper ads or articles			
Response	% Upper	% Lower	% All
Very effective	24.7	31.9	29.3
Somewhat effective	45.9	40.5	42.5
Not effective	28.9	27.4	27.9
DK/NA	0.5	0.3	0.4
Awareness posters, brochures or flyers			
Response	% Upper	% Lower	% All
Very effective	12.1	17.5	15.5
Somewhat effective	48.6	43.2	45.2
Not effective	39.0	38.9	38.9
DK/NA	0.2	0.4	0.4
Public meetings, seminars, or lectures			

Responses	% Upper	% Lower	% All
Very effective	14.8	17.8	16.7
Somewhat effective	33.6	32.3	32.8
Not effective	50.9	48.9	49.6
DK/NA	0.7	1.0	0.9

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Signs posted along the Etowah River

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Responses	% Upper	% Lower	% All
Very effective	17.3	22.6	20.7
Somewhat effective	33.3	28.1	30.0
Not effective	47.7	47.7	47.7
DK/NA	1.7	1.6	1.6

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Educational materials distributed in schools

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Responses	% Upper	% Lower	% All
Very effective	34.3	39.7	37.8
Somewhat effective	31.4	26.6	28.4
Not effective	32.6	33.0	32.9
DK/NA	1.7	0.6	1.0

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Personal email

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Responses	% Upper	% Lower	% All
Very effective	23.2	21.8	22.3
Somewhat effective	25.9	25.8	25.8
Not effective	50.6	52.0	51.5

DK/NA	0.2	0.4	0.4
Internet website			
Responses	% Upper	% Lower	% All
Very effective	25.4	28.2	27.2
Somewhat effective	32.3	27.5	29.3
Not effective	41.5	43.7	42.9
DK/NA	0.7	0.6	0.6

*Note.* See Figure 4.5

*Table 4.12.* Most effective method of communication

Responses	% Upper	% Lower	% All
TV or Radio announcements	36.4	36.9	36.8
Newspaper ads or articles	14.7	15.6	15.3
Awareness posters, brochures, or flyers	4.1	4.8	4.6
Public meetings, seminars, or lectures	5.1	2.4	3.3
Signs posted along the Etowah River	3.2	3.4	3.3
Educational materials distributed in the schools	11.5	14.4	13.4
Personal email	16.6	12.0	13.6
Internet website	8.3	10.6	9.8

*Note.* See Figure 4.6.

*Table 4.13.* Interest in public policy

Responses	% Upper	% Lower	% All
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Very interested	48.1	45.2	46.3
Somewhat interested	45.7	46.6	46.3
Not interested	6.2	8.1	7.4
DK/NA	0.0	0.1	0.1
<i>Total interested</i>	<i>93.8</i>	<i>91.8</i>	<i>92.6</i>

*Note.* Percents in italics represent a combination of responses indicated.

*Table 4.14. Activities to influence public policy*

Responses	% Upper	% Lower	% All
Attended a county commission, planning commission, or city council meeting	21.5	13.8	16.6
Written or spoken with a public official	37.5	28.5	31.8
Signed a petition regarding a particular issue	23.7	19.9	21.3
Written a letter to the editor of a newspaper	9.1	4.3	6.1
<i>Total participated</i>	<i>91.8</i>	<i>66.5</i>	<i>75.8</i>

*Note.* Percents in italics represent a combination of responses indicated (see Figure 4.7)

*Table 4.15. Involvement in organizations*

Responses	% Upper	% Lower	% All
No	91.9	93.7	92.8
Yes - Upper Etowah River Alliance	0.2	0.0	0.1
Yes - Lake Allatoona Preservation Authority	0.0	0.0	0.0
Yes - Audobon Society	0.5	0.7	0.6

Yes - The Nature Conservancy of Georgia	0.7	1.0	0.9
Yes - Upper Chattahoochee River Keeper	0.2	0.0	0.1
Yes - Altamaha River Keeper	0.0	0.0	0.0
Yes - Georgia Conservancy	0.7	0.3	0.5
Yes - Georgia Wildlife Federation	1.0	0.7	0.8
Yes - Other specific organizations mentioned	6.9	5.6	6.1
DK/NA	0.2	0.0	0.0

*Table 4.16. Obstacles to being involved in improving environmental conditions*

Responses	% Upper	% Lower	% All
Lack of time	53.8	52.6	53.0
Lack of money	7.4	6.0	6.5
Lack of interest or desire	8.4	8.8	8.7
Lack of information about how you can get involved	18.0	22.5	20.9
Other (respondent offers)	8.6	8.8	8.8
DK/NA	3.7	1.3	2.2

*Note.* See Figure 4.8

*Table 4.17. Preservation of rivers and streams in the Etowah River Basin requires the continuous efforts of everyone in our local communities.*

Responses	% Upper	% Lower	% All
Strongly agree	47.7	39.0	42.2
Agree	47.7	56.0	52.9

Disagree	3.5	2.4	2.8
Strongly disagree	0.5	0.4	0.5
(Respondent offers) Neutral	0.0	0.9	0.5
DK/NA	0.7	1.3	1.1
<i>Total agree</i>	<i>95.4</i>	<i>95.0</i>	<i>95.1</i>
<i>Total disagree</i>	<i>4.0</i>	<i>2.8</i>	<i>3.3</i>

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*Note.* Percents in italics represent a combination of responses indicated.

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*Table 4.18.* The actions of people who live upstream in the Etowah River Basin can have a serious impact on the water quality for those who live downstream.

Responses	% Upper	% Lower	% All
Strongly agree	51.1	49.9	50.3
Agree	44.2	45.2	44.8
Disagree	0.5	2.8	2.0
Strongly disagree	0.5	0.0	0.2
(Respondent offers) Neutral	0.7	0.0	0.3
DK/NA	3.0	2.1	2.4
<i>Total agree</i>	<i>95.3</i>	<i>95.1</i>	<i>95.1</i>
<i>Total disagree</i>	<i>1.0</i>	<i>2.8</i>	<i>2.2</i>

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*Note.* Percents in italics represent a combination of responses indicated.

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*Table 4.19.* It is important for me to help educate others about the impact of their activities on the water quality in the Etowah River Basin.

Responses	% Upper	% Lower	% All
Strongly agree	18.5	16.1	17.0

Agree	61.7	63.3	62.5
Disagree	15.6	14.0	14.5
Strongly disagree	1.0	1.1	1.1
(Respondent offers) Neutral	2.5	2.1	2.3
DK/NA	0.7	3.7	2.6
<i>Total agree</i>	<i>80.2</i>	<i>79.4</i>	<i>79.5</i>
<i>Total disagree</i>	<i>16.6</i>	<i>15.1</i>	<i>15.6</i>

*Note.* Percents in italics represent a combination of responses indicated.

*Table 4.20.* Before taking this survey were you aware that you live near the Etowah River Basin?

Responses	% Upper	% Lower	% All
No	27.7	32.5	30.7
Yes	71.6	66.5	68.4
DK/NA	0.7	1.0	0.9

*Table 4.21.* Drinking water source

Responses	% Upper	% Lower	% All
Lake Lanier	22.0	4.6	10.9
Etowah River	19.0	9.0	12.6
Chattahoochee River	3.0	7.0	5.5
Lake Allatoona	11.6	18.1	15.7
Groundwater (well water)	21.0	13.5	16.3
Other (respondent offers)	3.2	14.2	10.2

DK/NA 20.2 33.6 28.7

Note. See Figure 4.9.

*Table 4.22. Diversity of fish and other aquatic life is essential to the health of the Etowah River Basin.*

Responses	% Upper	% Lower	% All
Strongly agree	37.8	37.7	37.8
Agree	52.8	53.4	53.2
Disagree	3.0	3.4	3.3
Strongly disagree	0.2	0.3	0.3
(Respondent offers) Neutral	1.0	0.9	0.9
DK/NA	5.2	4.3	4.6
<i>Total agree</i>	<i>90.6</i>	<i>91.1</i>	<i>91.0</i>
<i>Total disagree</i>	<i>3.2</i>	<i>3.7</i>	<i>3.6</i>

Note. Percents in italics represent a combination of responses indicated.

*Table 4.23. Local governments should restrict development in some areas to protect fish and other aquatic life.*

Responses	% Upper	% Lower	% All
Strongly agree	49.1	40.6	43.7
Agree	42.0	52.0	48.3
Disagree	4.9	3.3	3.9
Strongly disagree	0.7	1.1	1.0
(Respondent offers) Neutral	2.0	1.6	1.7
DK/NA	1.2	1.4	1.4

<i>Total agree</i>	<i>91.1</i>	<i>92.6</i>	<i>92.0</i>
<i>Total disagree</i>	<i>5.6</i>	<i>4.4</i>	<i>4.9</i>

*Note.* Percents in italics represent a combination of responses indicated.

*Table 4.24.* Buffer areas along streams and rivers help protect the habitat of fish and other aquatic life.

Responses	% Upper	% Lower	% All
Strongly agree	35.3	28.2	30.8
Agree	52.8	59.4	57.0
Disagree	3.2	3.0	3.1
Strongly disagree	0.7	0.3	0.5
(Respondent offers) Neutral	1.2	1.3	1.3
DK/NA	6.7	7.8	7.4
<i>Total agree</i>	<i>88.1</i>	<i>87.6</i>	<i>87.8</i>
<i>Total disagree</i>	<i>3.9</i>	<i>3.3</i>	<i>3.6</i>

*Note.* Percents in italics represent a combination of responses indicated.

*Table 4.25.* Some damage to rivers and streams is an acceptable cost of economic growth.

Responses	% Upper	% Lower	% All
Strongly agree	5.4	5.0	5.1
Agree	29.9	37.2	34.5
Disagree	42.5	41.5	41.8
Strongly disagree	18.8	12.8	15.0

(Respondent offers) Neutral	2.5	1.3	1.7
DK/NA	1.0	2.3	1.8
<i>Total agree</i>	<i>35.3</i>	<i>42.2</i>	<i>39.6</i>
<i>Total disagree</i>	<i>61.3</i>	<i>54.3</i>	<i>56.8</i>

*Note.* Percents in italics represent a combination of responses indicated.

*Table 4.26.* Continued urban and suburban expansion is essential to the economic well-being of the region.

Responses	% Upper	% Lower	% All
Strongly agree	8.4	6.1	7.0
Agree	34.6	44.7	41.0
Disagree	40.2	34.2	36.4
Strongly disagree	9.1	7.5	8.1
(Respondent offers) Neutral	3.2	3.3	3.3
DK/NA	4.4	4.1	4.2
<i>Total agree</i>	<i>43.0</i>	<i>50.8</i>	<i>48.0</i>
<i>Total disagree</i>	<i>49.3</i>	<i>41.7</i>	<i>44.5</i>

*Note.* Percents in italics represent a combination of responses indicated.

*Table 4.27.* The Endangered Species Act is too restrictive to land owners.

Responses	% Upper	% Lower	% All
Strongly agree	6.2	5.3	5.6
Agree	22.7	26.9	25.4
Disagree	39.3	39.5	39.4

Strongly disagree	9.9	8.3	8.9
(Respondent offers) Neutral	3.2	2.1	2.5
DK/NA	18.8	17.9	18.2
<i>Total agree</i>	<i>28.9</i>	<i>32.2</i>	<i>31.0</i>
<i>Total disagree</i>	<i>49.2</i>	<i>47.8</i>	<i>48.3</i>

*Note.* Percents in italics represent a combination of responses indicated.

*Table 4.28.* Restricting what people can do with their land is a violation of property rights.

Responses	% Upper	% Lower	% All
Strongly agree	19.0	18.9	19.0
Agree	41.0	42.3	41.8
Disagree	28.9	28.6	28.7
Strongly disagree	4.7	3.8	4.2
(Respondent offers) Neutral	4.4	3.1	3.6
DK/NA	2.0	3.1	2.7
<i>Total agree</i>	<i>60.0</i>	<i>61.2</i>	<i>60.8</i>
<i>Total disagree</i>	<i>33.6</i>	<i>32.4</i>	<i>32.9</i>

*Note.* Percents in italics represent a combination of responses indicated.

*Table 4.29.* Level of support for policies that protect aquatic species and their habitat.

A greenspace plan to purchase undeveloped land to protect forests and pastures.			
Responses	% Upper	% Lower	% All
Very supportive	61.0	59.8	60.3
Somewhat supportive	29.1	29.6	29.4

Not supportive at all	6.9	6.6	6.7
DK/NA	3.0	4.0	3.6
<i>Total supportive</i>	<i>90.1</i>	<i>89.4</i>	<i>89.7</i>

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A regional development plan that both protects endangered species' habitat and allows for future growth.

Responses	% Upper	% Lower	% All
Very supportive	52.1	57.7	55.6
Somewhat supportive	38.8	34.9	36.3
Not supportive at all	6.9	3.8	5.0
DK/NA	2.2	3.6	3.1
<i>Total supportive</i>	<i>90.9</i>	<i>92.6</i>	<i>91.9</i>

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Stricter regulations on future development to control stormwater run-off and protect the water quality of the river basin.

Responses	% Upper	% Lower	% All
Very supportive	55.6	59.1	57.8
Somewhat supportive	36.5	33.8	34.8
Not supportive at all	4.9	4.7	4.8
DK/NA	3.0	2.4	2.6
<i>Total supportive</i>	<i>92.1</i>	<i>92.9</i>	<i>92.6</i>

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Mandatory maintenance or inspection of septic systems to reduce water pollution.

Responses	% Upper	% Lower	% All
Very supportive	51.4	57.1	55.0
Somewhat supportive	32.8	31.3	31.9
Not supportive at all	13.6	9.8	11.2

DK/NA	2.2	1.7	1.9
<i>Total supportive</i>	<i>84.2</i>	<i>88.4</i>	<i>86.9</i>

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Increasing the size of buffer areas along streams and rivers in the Etowah River Basin.

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Responses	% Upper	% Lower	% All
Very supportive	50.6	44.7	46.9
Somewhat supportive	35.1	40.3	38.4
Not supportive at all	7.7	6.6	7.0
DK/NA	6.7	8.4	7.8
<i>Total supportive</i>	<i>85.7</i>	<i>85.0</i>	<i>85.3</i>

*Note.* Percents in italics represent a combination of responses indicated.

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*Table 4.30.* Most important reason to protect the water quality of the Etowah River

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Responses	% Upper	% Lower	% All
Protect property values along the river basin	2.0	1.0	1.4
Protect the quality of the drinking water	64.9	72.6	69.8
Maintain the natural beauty associated with clean waters	9.6	5.8	7.2
Provide safe swimming, boating and other recreational activity	0.5	0.9	0.7
Provide a good fishing environment	1.7	1.3	1.4
Protect the aquatic life in the river basin	11.1	10.8	10.9
(Respondent offers) Other...(specify)	8.6	6.1	7.0
DK/NA	1.5	1.4	1.4

*Note.* See Figure 4.10.

*Table 4.31. Responsible agency for environmental policy in the Etowah watershed*

Responses	% Upper	% Lower	% All
Federal Government	11.4	17.0	14.9
State Government	38.3	34.6	36.0
Local Government	27.9	25.2	26.2
Respondent offers- Federal and State	2.2	2.3	2.3
Respondent offers- Federal and Local	0.2	0.6	0.5
Respondent offers- Local and State	6.7	7.5	7.2
Respondent offers- Federal, State and Local	9.9	9.5	9.7
DK/NA	3.5	3.3	3.3
<i>Total combination of governments</i>	<i>19.0</i>	<i>19.9</i>	<i>19.7</i>

*Note.* Percents in italics represent a combination of responses indicated (see Figure 4.11).

*Table 4.32. Organizations that are responsible for monitoring and developing long-range plans for the Etowah watershed*

Responses	% Upper	% Lower	% All
No, not familiar with any organizations	82.2	84.2	83.5
Yes - Lake Allatoona Preservation Authority	2.0	2.7	2.4
Yes - Upper Etowah River Alliance	2.2	1.1	1.5
Yes - U. S. Army Corps of Engineers	3.0	2.6	2.7
Yes - State Dept. of Natural Resources (DNR)	2.7	2.8	2.8
Yes - Environmental Protection Division (EPD)	2.0	3.3	2.8
Yes - U. S. Environmental Protection Agency (EPA)	4.0	4.3	4.2

Yes - other specific organization mentioned	4.4	4.8	4.7
DK/NA	0.0	0.0	0.0

*Table 4.33. Level of threats to the water quality of the Etowah River*

Trash left by visitors			
Responses	% Upper	% Lower	% All
Very serious threat	57.0	58.5	58.0
Somewhat serious threat	36.8	35.3	35.9
Not a serious threat	4.4	5.4	5.1
DK/NA	1.7	0.7	1.1
Agricultural runoff			
Responses	% Upper	% Lower	% All
Very serious threat	46.7	46.9	46.8
Somewhat serious threat	38.3	39.3	38.9
Not a serious threat	8.4	7.3	7.7
DK/NA	6.7	6.6	6.6
Industrial waste			
Responses	% Upper	% Lower	% All
Very serious threat	82.0	84.3	83.5
Somewhat serious threat	11.6	11.7	11.7
Not a serious threat	3.0	1.9	2.3

DK/NA	3.5	2.1	2.6
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Fertilizer runoff from yards and lawns

Responses	% Upper	% Lower	% All
Very serious threat	44.0	42.6	43.1
Somewhat serious threat	42.5	44.6	43.8
Not a serious threat	10.4	9.0	9.5
DK/NA	3.2	3.8	3.6

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Erosion and sedimentation build-up

Responses	% Upper	% Lower	% All
Very serious threat	37.5	36.3	36.8
Somewhat serious threat	48.1	47.7	47.9
Not a serious threat	9.6	9.3	9.4
DK/NA	4.7	6.7	6.0

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Discharges from wastewater treatment plants

Responses	% Upper	% Lower	% All
Very serious threat	61.7	64.1	63.2
Somewhat serious threat	23.0	22.1	22.4
Not a serious threat	8.6	6.8	7.5
DK/NA	6.7	7.0	6.9

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Stormwater runoff

Responses	% Upper	% Lower	% All
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Very serious threat	17.3	19.5	18.7
Somewhat serious threat	48.4	52.0	50.7
Not a serious threat	28.9	22.5	24.8
DK/NA	5.4	6.0	5.8

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Leaking septic tanks

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Responses	% Upper	% Lower	% All
Very serious threat	58.8	59.4	59.2
Somewhat serious threat	26.4	27.8	27.3
Not a serious threat	9.9	8.8	9.2
DK/NA	4.9	4.0	4.3

*Note.* See Figure 4.12.

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*Table 4.34.* Most serious threat to the water quality in the Etowah River

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Responses	% Upper	% Lower	% All
Trash left by visitors	5.6	5.4	5.4
Agricultural runoff	5.3	3.4	4.1
Industrial waste	53.8	60.8	58.3
Fertilizer runoff from yards or lawns	5.0	2.9	3.7
Erosion and sedimentation build-up	5.8	4.1	4.7
Discharges from wastewater treatment plants	9.9	8.9	9.3
Stormwater runoff	2.6	1.5	1.9
Leaking septic tanks	12.0	13.0	12.6

*Note.* See Figure 4.13.

*Table 4.35. Some special-interest groups exaggerate the threats to the water quality of the Etowah River Basin.*

Responses	% Upper	% Lower	% All
Strongly agree	9.4	10.0	9.8
Agree	41.0	38.7	39.6
Disagree	27.4	27.1	27.2
Strongly disagree	6.7	5.8	6.1
(Respondent offers) Neutral	3.7	2.6	3.0
DK/NA	11.9	15.8	14.4
<i>Total agree</i>	<i>50.4</i>	<i>48.7</i>	<i>49.4</i>
<i>Total disagree</i>	<i>34.1</i>	<i>32.9</i>	<i>33.3</i>

*Note.* Percents in italics represent a combination of responses indicated.

*Table 4.36. Status of the water quality of the Etowah River*

Responses	% Upper	% Lower	% All
Excellent	2.0	2.3	2.2
Very good	7.4	8.0	7.8
Good	29.9	24.6	26.6
Fair	24.0	26.1	25.3
Poor	13.1	15.8	14.8
DK/NA	23.7	23.2	23.4

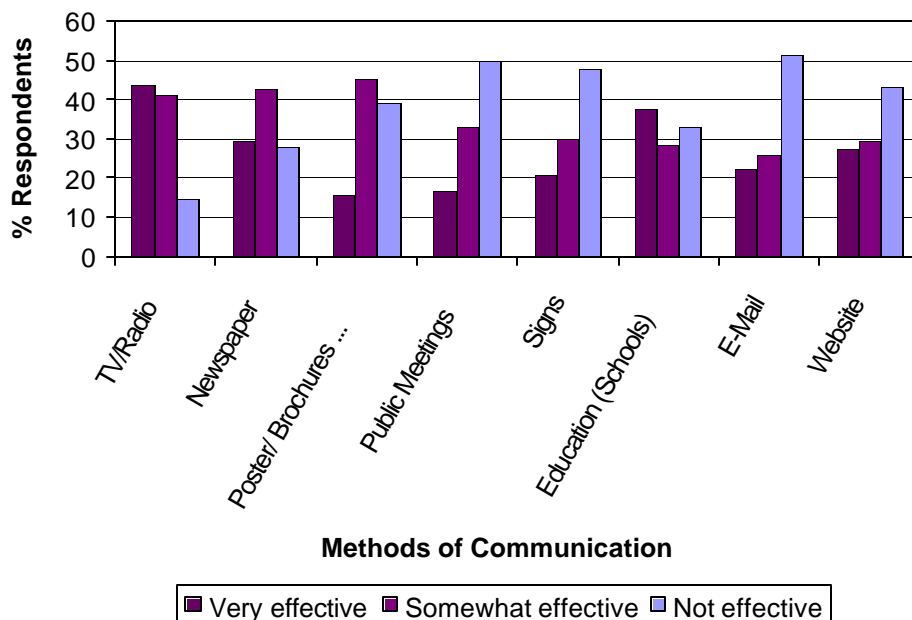
*Note.* See Figure 4.14.

*Table 4.37. Future water quality of the Etowah River over the next 5 to 10 years*

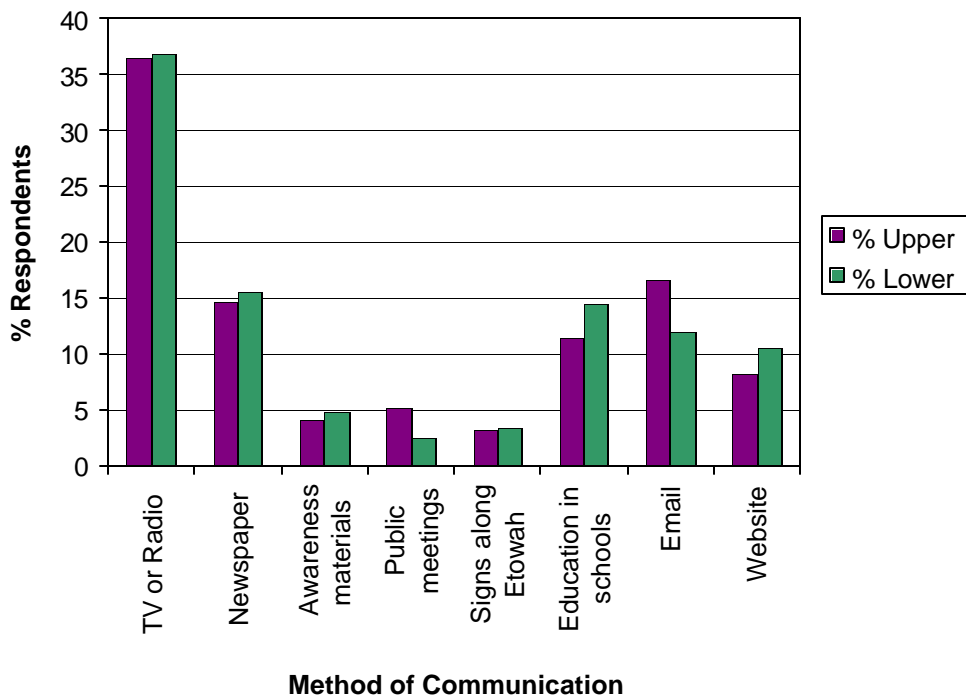
Responses	% Upper	% Lower	% All
Get a whole lot better	2.7	4.1	3.6
Get a little bit better	18.3	16.0	16.8
Get a little bit worse	32.3	38.0	36.0
Get a whole lot worse	33.8	29.9	31.3
(Respondent offers) Will stay about the same	3.0	2.6	2.7
DK/NA	9.9	9.4	9.6
<i>Total better</i>	<i>21.0</i>	<i>20.1</i>	<i>20.4</i>
<i>Total worse</i>	<i>66.1</i>	<i>67.9</i>	<i>67.3</i>

*Note.* Percents in italics represent a combination of responses indicated (see Figure 4.15).

### Survey Question Results Figures



*Figure 4.5.* All respondents' opinions about the effectiveness of different methods of providing information about environmental issues in the Etowah watershed. More respondents rated the effectiveness of particular methods of communicating this type of information as somewhat or not effective, with the exception of television and radio announcements. Respondents more often rated television and radio and education in schools as very effective and email, public meetings, and signs posted along the Etowah River as not effective (see Table 4.11).



*Figure 4.6.* Responses from both the Upper and Lower Etowah watersheds about the most effective method to provide information or communicate about environmental issues in the Etowah watershed. More respondents agreed that television or radio is the most effective compared to other methods. Upper Etowah respondents were more likely to choose personal email as the most effective method and Lower Etowah respondents were more likely to choose education in schools (see Table 4.12).

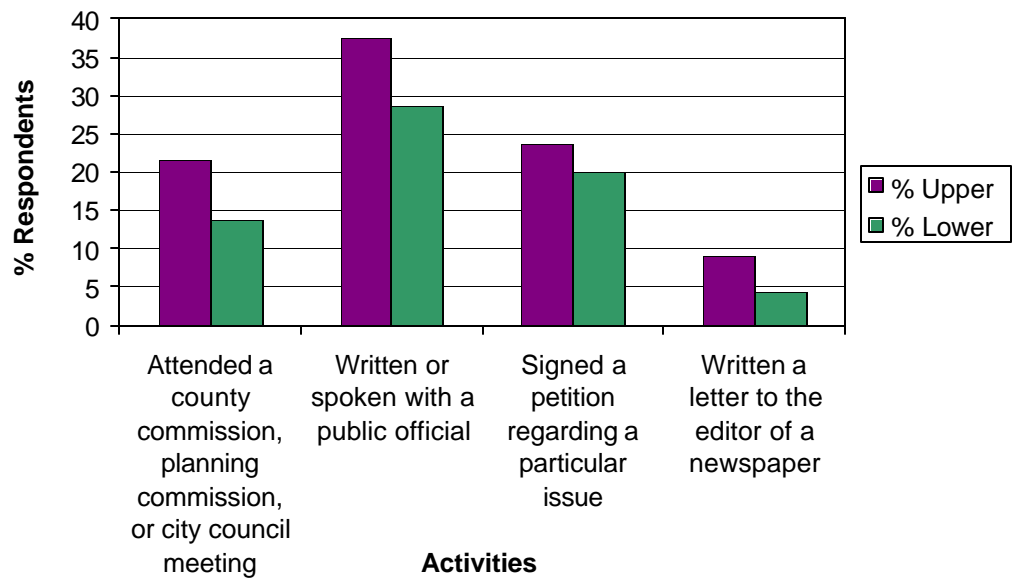


Figure 4.7. Comparison of the Upper and Lower Etowah responses when asked about participating in particular activities to influence public policy. More respondents from the Upper Etowah reported participating in various activities to influence public policy. Regarding the particular activities, more respondents reported writing a letter or signing a petition than other activities (see Table 4.14).

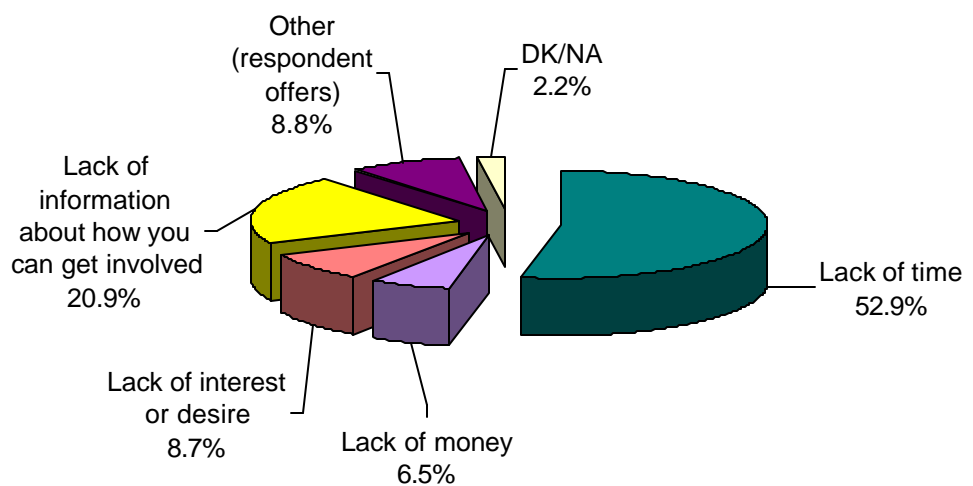
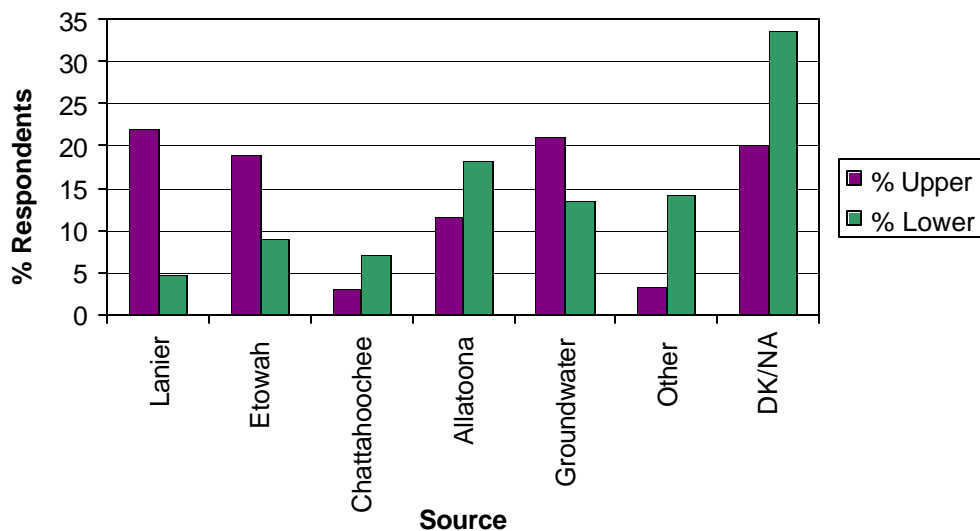


Figure 4.8. Obstacles that respondents reported to being involved in improving environmental conditions in the Etowah watershed. Upper and Lower Etowah respondents reported similar

obstacles and most often indicated lack of time and lack of information about how to get involved (see Table 4.16).



*Figure 4.9.* Comparison of the drinking water sources reported by the Upper and Lower Etowah respondents. Respondents were asked the source of their drinking water in their home, and many indicated that they do not know the source of their drinking water (see Table 4.21).

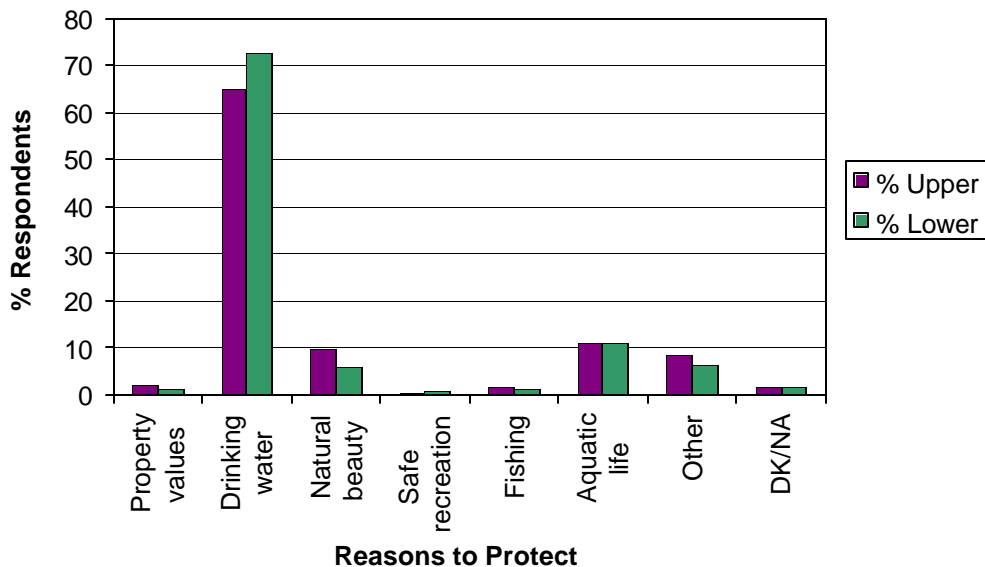


Figure 4.10. Comparison of the most important reasons to protect the water quality of the Etowah reported by the Upper and Lower Etowah respondents. Respondents were asked to respond to a list of reasons, and the majority reported protecting drinking water. In addition, more respondents from the Lower Etowah than the Upper reported drinking water and more respondents from the Upper Etowah than the Lower reported maintaining the natural beauty associated with clean water (see Table 4.30).

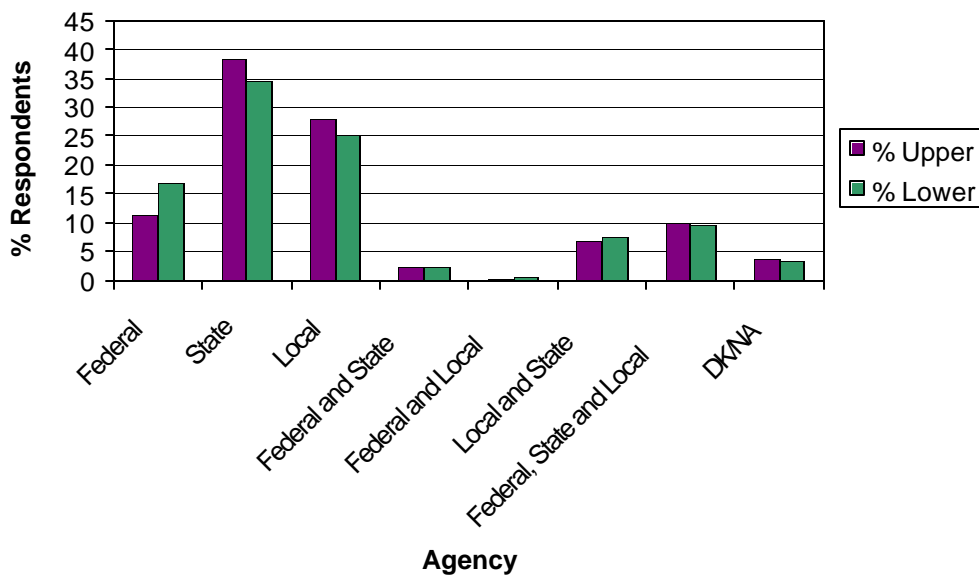


Figure 4.11. Comparison of the Upper and Lower Etowah responses for the agency or agencies that should be responsible for environmental policy in the Etowah watershed. Overall, more respondents believe that this should be the responsibility of the state or local government. Respondents from the Upper Etowah tended to indicate the State and Local governments, and more respondents from the Lower Etowah than the Upper Etowah indicated the Federal government as the responsible agency (see Table 4.31).

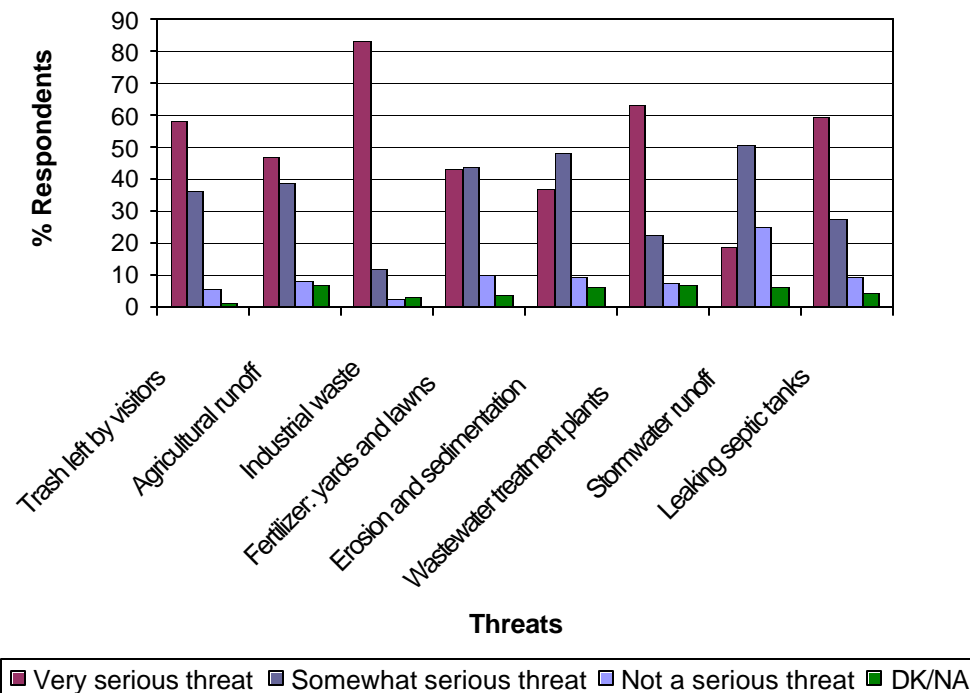
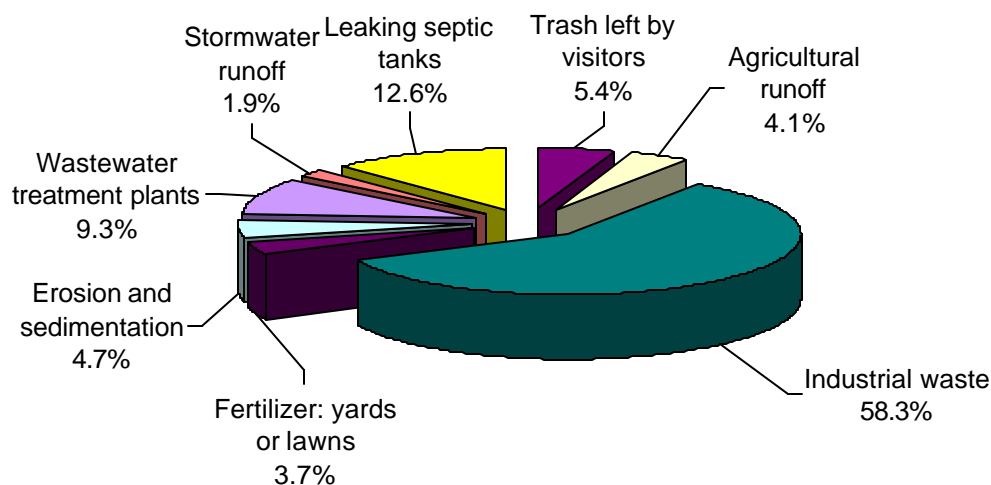
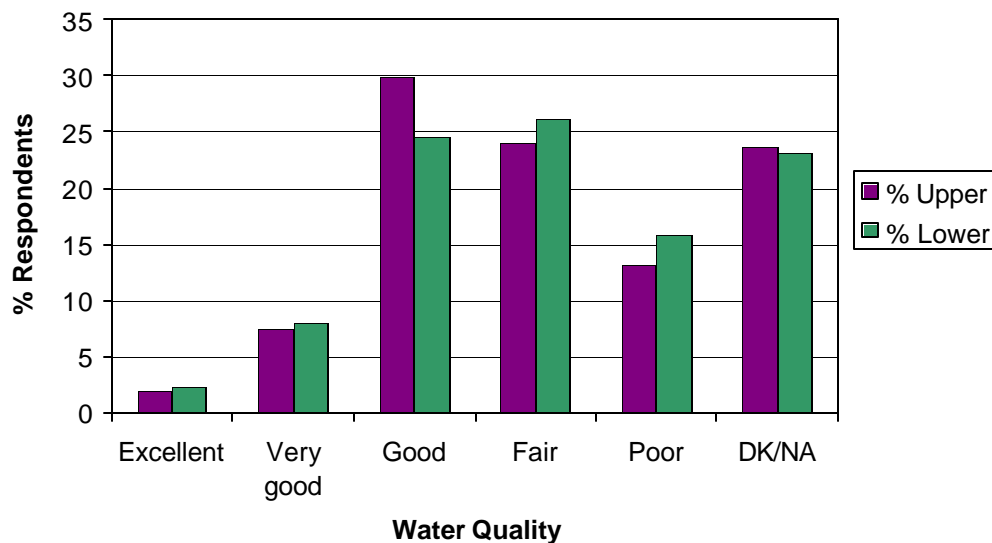


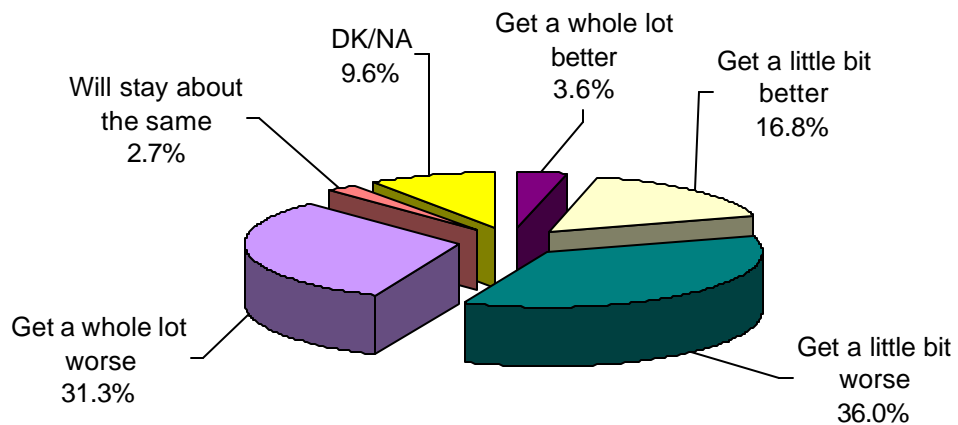
Figure 4.12. All responses for the level of different threats to the water quality of the Etowah River. Respondents were more likely to rate particular threats as very serious, with the exception of erosion and sedimentation, stormwater runoff, and fertilizer from yards and lawns. In addition, stormwater runoff was more often rated as not serious than any other threats listed. Respondents most often rated industrial waste, discharge from wastewater treatment plants, leaking septic tanks, and trash left by visitors as very serious threats (see Table 4.33).



*Figure 4.13.* All respondents' opinions of the most serious threat to the water quality of the Etowah River. The majority of respondents rated industrial waste as the most serious threat to the water quality of the Etowah. In addition, respondents were least likely to indicate stormwater runoff as the most serious threat (see Table 4.34).



*Figure 4.14.* comparison of the responses from the Upper and Lower Etowah about the status of the water quality of the Etowah River. Respondents from the Upper and Lower Etowah had slightly differing opinions, although many indicated that they do not know. Few respondents indicated that water quality is excellent or very good, and respondents from the Upper Etowah compared to the Lower were more likely to indicate that the water quality is good (see Table 4.36).



*Figure 4.15.* Comparison of the Upper and Lower Etowah opinions about the future water quality of the Etowah for the next five to ten years. More respondents indicated that the Etowah will get a little bit or a whole lot worse rather than better (see Table 4.37).

## CHAPTER 5

### DISCUSSION

In the previous chapters I presented a framework for the Etowah public environmental survey, how this survey was developed and implemented, and the survey results. I also provided an explanation of important components of a public involvement and education program, including conducting a survey as an initial step. In this chapter, I discuss the Etowah survey and how it will contribute to the Etowah public involvement and education program. I also discuss implications and recommendations for science and environmental education in schools as an important component of public involvement and education programs and the Etowah program in particular.

The Etowah public environmental survey was designed to reveal more about the residents' knowledge, opinions, and sense of empowerment about the Etowah watershed. The survey results will guide the development of a public involvement and education program in order to increase awareness and stewardship toward local environmental issues. In evaluating the Etowah survey results, there are two issues to consider: 1) Respondents choice to participate in the survey represents an interest in the topic (e.g., an interest in the community, environmental issues or general public interest), and therefore integrates bias into the survey. Survey results represent only those residents in the watershed who chose to participate; 2) Survey respondents represent a small percentage (0.0005%) of all of the residents in the Etowah watershed (see Table 4.1 for county population data). To address these issues and to ensure that the Etowah public involvement and education program addresses the needs of the entire community, we will encourage stakeholder (e.g., farmers, developers, landowners, environmentalists, business owners) participation in the development process. These stakeholders will participate in developing and implementing the involvement and education

program, as well as evaluating its success. The development process will be ongoing and will change with the needs and interests of the community and the local environment. Stakeholders and others involved in the Etowah HCP (e.g., the HCP Advisory and local government representatives) will use the survey results in addition to other resources (e.g., research into HCPs and other environmental programs) to develop the Etowah program.

#### *Guiding the Etowah Public Involvement and Education Program*

*Knowledge, opinions, and sense of empowerment.* The Etowah survey results provided information about the knowledge, opinions, and sense of empowerment of the residents in the watershed about the Etowah River and important environmental issues. These issues were the topics of the survey and include the Etowah River and its endangered species, development in the watershed, education and involvement in the community, and ordinances and regulations regarding development and protecting aquatic species.

The survey results from the knowledge and opinion questions provided information about specific topics and issues to address in the education program. These will be the focus of educational materials and opportunities that the program will provide to the general public. For example, the majority of the survey respondents are aware that diversity of aquatic species contributes to the health of the Etowah River (see Table 4.22). In addition, respondents understand that buffer areas (areas of land adjacent to the stream that consist of a certain amount of natural habitat) along streams play an important role in protecting aquatic habitat (see Table 4.24). On the other hand, respondents are unaware of the serious threats that are contributing to the decline of the diversity and water quality of the river. The most serious threats to the Etowah River today are caused by increased urbanization and include stormwater runoff and erosion and sedimentation (Freeman et al., 2002). When asked in the survey about the most serious threat, respondents were least likely to choose one of these two (see Table 4.34). We can address this misunderstanding in the involvement and education program by providing information about what the real threats are. We can also provide information about realistic

actions (e.g. following Best Management Practices (BMPs) for development projects, conservation subdivisions, and investment in conservation easements) that both individuals and communities can take in order to reduce the threats and their negative impacts. Survey results also suggest methods to provide these suggestions to the public, such as television and radio announcements, newspaper articles, and education in schools (see Tables 4.11 and 4.12).

Another misunderstanding revealed by the survey results refers to regulations and restrictions on development. A large majority of respondents support local government restrictions on development to protect aquatic life, but many also view restrictions as violations of property rights (see Tables 5.1 and 5.2 respectively).

*Table 5.1. Survey results regarding misunderstanding about development regulations, protecting aquatic diversity and water quality*

Development regulations and water quality	% All
A greenspace plan to purchase undeveloped land to protect forests and pastures.	91.0
A regional development plan that both protects endangered species' habitat and allows for future growth.	89.7
Stricter regulations on future development to control stormwater run-off and protect the water quality of the river basin.	91.9
Mandatory maintenance or inspection of septic systems to reduce water pollution.	86.9
Increasing the size of buffer areas along streams and rivers in the Etowah River Basin.	85.3
Local governments should restrict development in some areas to protect fish and other aquatic life.	92.0
Buffer areas along streams and rivers help protect the habitat of fish and other aquatic life.	87.8

Protecting aquatic diversity and water quality	
Diversity of aquatic life is essential to the health of the Etowah River Basin	92.6
Concern about property rights	
Restricting what people can do with their land is a violation of property rights.	60.8

This discrepancy may be highlighting the difference between a private property owner and a subdivision developer. The private property owner may own land along the Etowah River on which he or she wishes to build a house. The developer may be putting in a subdivision with several lots near the river. Although both of these types of development will impact the river, the difference lies in how much. The majority of the problems that the Etowah is facing now are from subdivision and other large development projects. These projects typically involve clearing significant amounts of land for houses, buildings and impervious surfaces (e.g., roads and parking lots). Consequently, these projects contribute significantly to problems with stormwater runoff and erosion and sedimentation. In comparison with the private property development, the subdivision project causes the most environmental damage and therefore would require more regulations.

If private property owners believe that restrictions on development will violate their property rights, the Etowah public involvement and education program can address this concern in different ways. Providing information about particular policies and regulations that restrict development and who they effect may reduce some concerns (see Table 5.2)

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*Table 5.2.* Issues to address in the Etowah public involvement and education program.

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Laws and regulations that protect aquatic species

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What are the federal, state, and local laws and regulations that protect aquatic species?

How do these laws and regulations affect public and private property owners

How can a proactive development plan (i.e. the Etowah HCP) address these issues?

How does public participation benefit the community and the Etowah River?

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#### Importance of aquatic species

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Why do we need to protect aquatic species?

How do aquatic species contribute to the river ecosystem? Water quality? Quality of life?

What aquatic species should we protect in the Etowah River?

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There are many ways in which we can communicate with the public and encourage participation in environmental issues in the Etowah watershed. We can provide this type of information by methods suggested by the survey results (e.g. television, radio, and newspaper; see Tables 4.11 and 4.12), and also by providing opportunities, like targeted audience and general public meetings, for interested stakeholders to discuss policies and regulations. Although these may not attract large audiences, they are effective in answering questions, addressing concerns, and receiving input. These methods are also a first-step to more direct public involvement in policy decisions (Konisky & Beierle, 2001).

Encouraging the public to be involved in the process of developing these policies through involvement in the HCP may also improve their understanding of the issues (Moorhouse & Elliff, 2002). Involvement in this process may increase public understanding that policies are developed to satisfy all residents of the community, including the local government officials, the citizens, and the aquatic life. We can encourage involvement by developing an environmental marketing campaign to stimulate interest in the issue, using media sources (e.g. television, radio and newspaper) and providing multiple opportunities for a variety of interests to be involved. Research into effective environmental marketing campaigns reveals important

components to developing such a campaign (Herbert & Leathers, 2002). A group of students at the Institute of Ecology in the University of Georgia conducted research on environmental marketing campaigns and discovered that effective campaigns need a consistent message to deliver to the public, a logo that the public can identify, and sufficient funding to implement the campaign (Herbert & Leathers, 2002). Members of the HCP Advisory Committee have already begun developing such a campaign by working with a marketing consultant and developing a marketing message.

Survey results revealed that a large majority of respondents would support most of the policies recommended to protect water quality and aquatic life, including a regional development plan, a greenspace plan, increased buffer areas, and stricter regulations on future development (see Table 4.29). Support for these policies further suggests that increased public understanding of the issues and regulations would relieve some misunderstandings.

When considering the topics and issues that the public involvement and education program will address, we also have to consider how to provide this information and communicate with the public. Survey results indicate that the most effective method for the Etowah watershed is television and radio announcements. Other effective methods include newspaper, educational materials (e.g., posters, brochures, flyers) and education in schools. The Etowah program will take these results into consideration and use a variety of methods of communication as well as provide a variety of opportunities for involvement. Using multiple approaches will ensure that all interests and members of the community are provided the same opportunities to become informed and participate in the issues (see the *Multiple approaches* subsection in Chapter 2).

Several survey questions addressed sense of empowerment on issues in the Etowah watershed. The results for these questions will help those involved with the Etowah public involvement and education program understand the level of motivation and interest in taking action among residents in the watershed. This information provides a starting point for getting

the public involved in the Etowah HCP and other environmental issues. For example, the majority of the survey respondents indicated that they are interested in public policy in the watershed (see Table 4.13). Although interest does not guarantee action, it does indicate a first step to being involved in important issues. In addition to indicating interest, many respondents also reported participating in various activities to influence public policy (see Table 4.14). On the other hand, the majority of the respondents in the watershed are not active in local or other environmental organizations (see Table 4.15).

These results indicate that the general interest in local issues is established but not the motivation to take action and be involved. The task of the Etowah program is to translate interest into participation in the HCP and other local environmental issues. Results from several survey questions indicate that residents in the Etowah watershed are interested in environmental issues, but either do not fully understand the problems (as discussed above), or have not taken the steps to get involved. Respondents indicated that lack of time and lack of information about getting involved are the most significant obstacles to participation (see Table 4.16). The Etowah involvement and education program can address these obstacles in several different ways. For example, providing a variety of opportunities for involvement allows people to choose options that best fit their interests and schedules. These opportunities might include organized educational trips down the Etowah, or river education days at schools or as a weekend event with displays about important issues and ways to get involved. To advertise for these and other options for involvement, survey results indicated that the most effective methods of communication for the Etowah watershed include television, radio and newspaper announcements, and other media (see Table 4.12).

In addition to having a general interest in public policy, community members in the Etowah watershed understand that everyone in the community must make an effort and work together continually to preserve the Etowah River (see Table 4.17). Residents also feel a personal responsibility to educate others about their actions and how they impact the water

quality of the river (see Table 4.19). These results further suggest for the Etowah program that although residents may not be currently taking action, they understand the importance of being involved and being part of a community effort. The Etowah public involvement and education program can use this information by reminding residents that they are part of a community that depends on the Etowah River for many uses. Therefore, it is everyone's responsibility to be involved in issues that affect the river. Similarly, when asked about the most important reason to protect water quality of the Etowah, most respondents indicated drinking water (see Table 4.30). This response demonstrates that residents understand a connection between the Etowah River and their everyday lives. Public understanding of this connection may help to generate interest and participation in the issues.

*Upper and Lower Etowah responses.* Differences in responses from the Upper and Lower Etowah watersheds can also guide the development and implementation of the public involvement and education campaign. The Upper Etowah watershed is the northern section of the watershed that encompasses the headwaters of the Etowah as well as the mainstem and other tributaries. Some streams in this section of the Etowah tend to be faster flowing and cooler than those downstream in the lower section. These streams are also well known for trout fishing, and many are stocked for fishing purposes. The Lower Etowah watershed is the southwestern section of the Etowah and encompasses Lake Allatoona, parts of the mainstem and tributaries. Streams in this section tend to be slower flowing and slightly warmer than those in the upper section are also well known for striped bass fishing. Many endangered species that are found in the Upper Etowah are no longer found in the Lower Etowah due to the effects of the dam and metropolitan Atlanta.

Survey results indicate that residents in the Upper Etowah watershed are more interested in public policy than those in the Lower Etowah and that they are more aware of and supportive of the issues. More respondents in the Upper Etowah reported participating in activities to influence public policy and were aware of living in the Etowah watershed (see

Tables 4.14 and 4.20, respectively). In addition, more respondents from the Upper Etowah were aware of the source of their drinking water (see Table 4.21). More Upper Etowah respondents also do not believe that urban and suburban expansion is essential to the economic well being of the region (see Table 4.26).

There are several factors that could play a role in the differences in opinion between the Upper and Lower Etowah respondents. Residents in the Upper Etowah are in the area in which the majority of the endangered aquatic species are located. Respondents from this area may not be as supportive of increased growth, as indicated above, because they have seen the recent changes in development and recognize the impacts on the aquatic species. The endangered species located in the Upper Etowah have also been the topic of interest for newspapers and other media sources. On the other hand, the residents in the Lower Etowah, which are closer to metropolitan Atlanta, have different opinions about urban and suburban expansion. Perhaps more of these residents have been living in urban areas for longer periods of time and see more advantages than disadvantages. These residents also may not be as exposed to the media about the endangered species and impacts of development as those in the Upper Etowah.

Understanding these differences in opinions in the two sections of the Etowah watershed is important in developing and implementing the public involvement and education program. Our program in the Upper Etowah could highlight the importance of the aquatic species as well as explain the importance of public participation in developing a plan to minimize impacts on these species. In the Lower Etowah, the program could focus on education about the previous existence of many aquatic species in the area and the reason for their decline. The program could also focus on the importance of the participation of everyone in the entire Etowah watershed to protect the water quality of the river. It is important that residents understand the benefits of managing the Etowah watershed as a whole ecosystem, and that everyone in the

community participate in the efforts (see *Communication* and *Participation* subsections in Chapter 2).

As discussed above, the Etowah public environmental survey results guide the development of the public involvement and education program by providing information about the level of knowledge, opinions, and sense of empowerment in the watershed and highlighting the important differences between the two sections of the watershed. The survey results also provide insight into addressing the components of the education program discussed in Chapter 2. For example, our understanding of the knowledge level about important environmental issues provides information about particular topics of focus in the education program. The survey results increase our understanding about effective ways to communicate with the public, such as television and radio announcements. Respondents indicated an understanding of the importance of the participation of everyone in the community, and also revealed particular obstacles to being involved in local environmental issues. In addition, survey results suggested that using a variety of methods of communication as well as providing a variety of opportunities for education and involvement may encourage more participation.

#### *Implications for Education in Schools*

The Etowah survey results also reveal that using a variety of methods of communication and providing a variety of opportunities for involvement and education includes education in schools (see Tables 4.11 and 4.12). Research has also shown that effective public involvement and education programs should work with children and youth in addition to working with adults (see Bjorkland & Pringle, 2001; Hudson, 2001; Popovic, 1993).

Environmental education in schools encompasses many of the same aspects as public environmental education, such as knowledge about the issues, positive environmental attitudes, sense of empowerment, participation in the community, and multiple learning opportunities. Bogner (1998) proposes that “the ultimate goals of environmental and ecological education [are]

fostering responsible environmental behavior, effecting long-term changes of students' attitudes toward conservation and nature, and providing basic ecological knowledge" (p.17).

Environmental education in schools prepares students to be responsible citizens by helping students develop a sense of empowerment, and helping them understand that their knowledge and actions, both individual and collective, can make a difference in environmental conditions (Hudson, 2001; Hungerford & Volk, 1990). Encouraging confidence and empowerment is part of a movement in environmental education to avoid the "psychology of despair" (Bjorkland & Pringle, 2001, p. 281; Hudson, p. 287). Effective environmental education encourages students to take action in environmental issues and remain realistic and positive about the future.

Hungerford and Volk (1990) suggest that environmental education in schools has not been effective in leading to "environmentally responsible citizens" (p.9), which involves knowledge, attitudes (or sensitivity), skills, and active participation in local environmental issues. Hungerford and Volk propose that a reason for this downfall is that empowerment, a significant part of motivation to act, has been neglected in schools and needs to be brought back into focus. Empowerment includes perception of knowledge and skill in taking action, locus of control, and intention to act (Hungerford & Volk, 1990; see also Hudson, 2001). Past research has shown that school programs focusing on ownership and empowerment can lead to positive changes in environmental behaviors after school hours (Hungerford & Volk, 1990).

Hungerford and Volk (1990) recommend that education in schools provide more opportunities for outdoor, community experiences that allow students to engage in a non-formal, participatory learning atmosphere. Similarly, Hudson (2001) suggests that environmental education must encourage students to move from awareness to action. Environmental education must also provide multiple learning opportunities and experiences that build upon one another in the students' learning experiences.

Research in ecology, environmental education and science education has also recognized the need for improvements in science education in schools to increase understanding and participation in environmental issues. Society needs to work toward science education that will “train the next generation of scientists” (Bjorkland & Pringle, 2001, p. 280) to better understand the environment and focus on preserving and restoring aquatic natural resources (Bjorklan & Pringle, 2001; Hudson, 2001).

Research and surveys provide suggestions for improvements in incorporating environmental education into the science education curricula. Teachers often experience logistical, attitudinal, knowledge and conceptual barriers in incorporating environmental education into the classroom (Ham & Sewing, 1987-1988). Suggestions to help teachers overcome these barriers include incorporating environmental education into other curricula (in addition to science), improving access to resources, networking with schools and other programs with similar goals, and providing opportunities for in-service workshops and training (Ham & Sewing, 1987-1988; Lane & Wilke, 1994).

In addition to teacher training, improvements in environmental education also involve movements in science education to improve students’ scientific learning experiences and understanding of the natural environment. Published in 1996, the National Science Education Standards (NSES) were designed to assess student performance in science and promote further accomplishments (National Research Council (NRC), 1996). The Standards serve as guidelines for science teachers to work toward more scientifically literate students with improved skills in applying knowledge and participating in community issues. The NSES provide “unifying concepts and processes” (Rakow, 1998, pp. 26-27) for all grades and provide concepts and skills for specific grades (Rakow, 1998).

The NSES also recommend a shift in science education toward more direct interactions and observations in the students’ environment, including the community. One of the basic principles of the standards, “learning science is an active process,” (Rakow, 1998, p.2)

encourages inquiry-based learning and constructivism, or student participation in their personal learning processes and experiences. The science standards are also based on the principle of moving from laboratories to real events, toward more involvement with local and global issues (Rakow, 1998). Although laboratory experiments are useful in providing examples of real events that are difficult to observe within the limitations of a classroom, students' understanding of these experiences are highlighted when combined with direct observations and interactions with the natural world.

For example, systems and interactions of components are concepts that students begin to explore in middle school and are difficult for many students to grasp (Rakow, 1998). To extend the students' learning experience beyond the classroom and encourage active participation, students could create their own system, like an outdoor garden. Since the students are directly involved in creating this system, they develop a better understanding of the important roles of the different components of the system and have the opportunity to explore change within the system. There are also many possibilities to extend this experience beyond the school grounds. Students can expand their observations to other natural systems, like forests or rivers. Students can also extend their experience by working with other classes, or with the community in growing the garden or donating the vegetables to a local food bank. Environmental education projects like outdoor gardens expand students' learning experiences and to encourage them to apply their knowledge and skills to real events.

Environmental education also contributes to students' capabilities in scientific literacy. According to the NSES scientific literacy is "the knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity" (NRC, 1996, p.22). Environmental education extends beyond providing an opportunity for direct interaction with the environment. For example, environmental education teaches students about human interactions with the environment, human use of natural resources, and human impacts on the environment (NRC, 1996). These concepts

contribute to students' scientific literacy by teaching them about their personal interactions with the local environment as well as their responsibility to be aware of the impacts of their actions. Through environmental education, students also learn about the importance of their role in the community to participate in local issues (Bogner, 1998; Hudson, 2001; NRC, 1996).

*Middle school students, environmental education, and service learning.* Scientific inquiry creates a link between middle school education, environmental education and service learning. Scientific inquiry is a learning process in which students describe, question, explain, test their explanations, and communicate with others about problems and solutions (NRC, 1996). Middle school students are at a point in their lives in which they are experiencing personal changes, physically, emotionally, and mentally, and these changes are reflected in their interests in school (National Middle School Association (NMSA), 2003). Because of these changes and experiences, middle schools students are naturally inclined toward inquiry and are “interested in investigating relationships, applying science to their daily lives, considering implications for society and the environment, and beginning to make personal career decisions” (Rakow, 1998, p.2).

Scientific inquiry is also an important part of environmental education and therefore is particularly appropriate for middle school students. While exploring the natural world and learning about interactions with the environment, students are engaged in inquiry-based processes, such as problem solving, observation, producing measurable outcomes, and challenging misconceptions (Hudson, 2001). For example, in the garden project discussed above, students are learning about systems and their components by creating their own system. In this process students problem solve by developing the methods of creating their system, and working through pitfalls along the way. Students make direct observations about the system they have created, and how it changes over time. In addition, students can discuss their own beliefs and understandings about systems and how components are interconnected and depend on one another to function.

Another important component of science education, environmental education, and middle school education is democratic service learning (Hudson, 2001; Pate, 2003; Schukar, 1996; NMSA, 2003). Democratic service learning is a process in which students, teachers and community members work together to address a community issue. Participants determine the issues to address as well as develop the project goals, objectives and activities (Pate, 2003). Democratic service learning is linked to current learning theory that emphasizes inquiry-based learning. By participating in democratic service learning projects, students and teachers approach scientific issues as real scientists do. According to Schukar (1996), service learning “bridges the gap between ‘school learning’ and ‘real-world problems’” (p. 10).

The inquiry-based approach in service learning projects is also linked with The National Science Education Standards (Schukar, 1996). For example, Teaching Standard A in the NSES suggests that teachers provide an inquiry-based learning atmosphere for science students in which teachers “select science content and adapt and design curricula to meet the interests, knowledge, understanding, abilities, and experiences of students” (NRC, 1996, p. 30). Students and teachers also use inquiry-based methods to explore different problems and solutions in their service learning project. When students and teachers are engaging in democratic service learning, they determine the framework and goals for their program to suit unique interests and needs of the class and the community.

Students, teachers and community members benefit from engaging in democratic service learning activities (Pate, 2003; Schukar, 1996). For example, through service learning students experience:

- a. “Decrease of rate of school suspensions, dropouts, failure and teenage pregnancies
- b. Positive attitudes toward adults
- c. Gains in self-confidence, self-esteem, and self worth
- d. Gain career skills and career exploration knowledge

- e. And growing more concerned about their community and community issues” among others (Pate, 2003, p. 2).

In addition, research suggests that students’ and teachers’ active role in determining what and how they are learning improves the student’s learning experience (Pate, 2003). Teachers benefit from service learning by learning more about integrating curriculum with community needs, engaging in inquiry-based approaches to science education and being creative in satisfying science education standards (Schukar, 1996). The community learns more about the students, teachers and the schools by interacting and helping to define community needs and projects and being involved in planning and supervision. Increasing communication and cooperation in the community will help to address important issues more effectively (see *Communication* subsection in Chapter 2).

The importance of communities’ addressing environmental issues is becoming more apparent as more issues are revealed through increased knowledge and technology. Increased knowledge and technology has also led to increased understanding of solutions and methods of prevention. As society recognizes the significance of environmental issues, it is important that students discuss the issues, address their misconceptions, and explore their explanations of the problems and solutions (Bogner, 1998; Hudson, 2001). Students’ involvement in community issues is an essential part of environmental education in schools and service learning is an effective way to provide that involvement (Bogner, 1998; Hudson, 2001; Hungerford and Volk, 1990).

Service learning also involves multiple learning opportunities and environments that complement the diversity of middle school students (NMSA, 2003, and Schukar, 1996). NMSA (2003) provides suggestions for effective middle school programs that include: “curriculum that is relevant, challenging, integrative, and exploratory; multiple learning and teaching approaches that respond to [students’] diversity; assessment and evaluation programs that promote quality learning; organizational structures that support meaningful relationships and learning; school-

wide efforts that foster health, wellness, and safety; and multifaceted guidance and support services” (NMSA, 2003, p.7). By engaging in democratic service learning projects, middle school students and teachers address all of these components (Pate, 2003; Schukar, 1996).

*Education in schools in the Etowah watershed.* Learning about the significance of environmental education and democratic service learning in middle schools is an important step in the development of the Etowah public involvement and education program. Education in schools is one of a variety of methods used to communicate with the public and encourage involvement in the Etowah HCP and other local environmental issues. The *Etowah Education Initiative*, an environmental, democratic service learning project for middle school students in the Etowah watershed, is a component of the Etowah public involvement and education program that is working toward increasing community awareness and participation in local environmental issues.

The goal of the *Etowah Education Initiative* is to provide middle school students, their teachers, and the community the tools they need to learn about and help address environmental issues. Examples of environmental issues in the Etowah watershed include sedimentation, pollutants and toxins, fragmented habitat, hydrologic alteration, habitat alteration, and exotic species, all of which are threats to the health of the Etowah River and its aquatic species (Freeman et al., 2002). The objectives of the *Etowah Education Initiative* include:

1. Increase learning and deepen understanding of environmental and scientific concepts among middle school students, teachers, and community members;
2. Link middle school student and teacher researchers with scientists and environmental educators and community members in scientific inquiry;
3. Foster a commitment to identify and work toward resolving environmental issues related to the Etowah watershed through service learning activities; and,
4. Address and document state and national standards associated with student learning.

In addition to increasing understanding of environmental and scientific concepts in general, components of the *Etowah Education Initiative* are also linked with the Georgia Quality Core Curriculum standards (QCCs). The QCCs for middle school students, grades 5-8, define *topics* that students in each grade level should understand by the end of each year. The QCC topics are also divided into different *strands*, such as physical science, life science, or earth and space science (retrieved November, 2003 from the Georgia Department of Education website, <http://www.doe.k12.ga.us/>). An example of the QCCs topics for 7<sup>th</sup> grade include:

1. Science inquiry process
2. Reference skills
3. Safety skills
4. Standard international measurements
5. Living things, and
6. Ecology/Interdependence of life

Each topic is also accompanied by standards that describe more specific components that each topic addresses ([www.doe.k12.ga.us/](http://www.doe.k12.ga.us/)). The environmental service learning projects and other environmental education strategies in the Etowah watershed address a variety of QCC topics and standards for all middle schools levels. The topics and standards that are addressed depend on the unique program or project. The following is an example of a service learning project that addresses several state QCCs.

*Etowah Education Initiative: Threats to aquatic life and their habitat in the Etowah River.*

There are many effects of increased development that are threatening aquatic life and their habitats in the Etowah River. For example, increased sedimentation, or build up of sediment, in tributaries and the mainstem of the Etowah River are threatening the water quality as well as the aquatic life in the river (Burkhead et al., 1997; Freeman et al., 2002). Sedimentation is caused by deforestation, construction, mining and other land-use practices that lead to increased soil erosion and loads of sediment in the river. Increased sediment leads to increased pollutants and

toxins in the water as well as decreased habitat and other needs of the aquatic life (e.g., oxygen, food and shelter) (Burkhead et al., 1997).

Students and teachers involved in this service learning project learn about sedimentation in the Etowah watershed, developing an understanding of what it is, what causes it, how it affects aquatic life, and why it is an issue of concern. Students and teachers begin this project by determining the goals, objectives, and activities of their project, outlining how they plan to accomplish these goals and the outcomes they expect. This process also involves determining methods to evaluate their progress and assess the final outcomes of their project, as well as determining resources and contacts they need in order to complete their project.

In order to learn more about the issues, participants conduct research on the different aquatic species in the river (e.g., fishes, insects, and amphibians), their individual adaptations and needs, and how they might be affected by increased sedimentation. Research methods could include using reference materials in addition to conducting hands-on experiments to learn about the effects of sedimentation on habitat and water quality (e.g., designing and building classroom aquaria). Participants investigate past and present research on these topics and contact universities and local agencies and organizations, such as the Georgia Department of Natural Resources, the Georgia Conservancy and the Upper Etowah River Alliance, who are experts in the field and have long-term experience in the studying the Etowah River.

The service learning project I described covers several state QCCs. For example, the students are actively involved in the development of their service learning project by determining their goals, monitoring their progress and assessing their outcomes. All of these processes are essential components of scientific inquiry (<http://www.doe.k12.ga.us/>). Through their research, students also develop reference skills, and learn about the importance of cooperation with scientists and other researchers. In this particular service learning project, students and teachers also address QCC topics while studying the aquatic life in the Etowah river (see Table 5.3).

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*Table 5.3. Service learning in the Etowah watershed and Georgia QCCs middle school science.*

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Georgia QCC	Activities in service learning project
<i>Science inquiry process</i>	Determining goals, objectives and activities, monitoring progress, assessing outcomes  Researching, observing, describing, questioning, and communicating throughout the project
<i>Living things/animals</i>	Researching and observing aquatic life and their habitat
<i>Ecology/Interdependence of life</i>	Researching about and observing aquatic species' adaptations to their habitats and environment  Researching and discussing aquatic food web and food chain interactions
<i>Human interactions with the environment</i>	Researching and discussing human use of natural resources and impacts on the environment (e.g., development and sedimentation)

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Each service learning project is unique to the needs and interests of the students and teachers, and the project I described above provides a framework for students and teachers to begin developing their own project.

It is important that science education continue to improve students' learning experiences through environmental education and democratic service learning, which work toward increasing student understanding of their environment and their role in participating in the community. These aspects become even more important today as society and education focus more on advanced technology. It is important that students become familiar with both current technology and community issues so they can become knowledgeable, participatory members of society. Public involvement and education programs are becoming more significant components of working on local environmental issues, like decreasing water quality or water

supply. These programs must involve everyone in the community, especially school children to teach them to become active community members. If public involvement and education programs are successful and continue to grow in communities, then perhaps solving local environmental issues will become proactive, working toward preventing problems, rather than reactive as many are today.

### *Summary*

The Etowah River supports a high diversity of aquatic species and is in a unique area that is treasured by many people in the community and all around Georgia. Currently, scientists and other researchers, and local, state and federal agencies are working with local government representatives to develop the regional Etowah HCP, a plan that will protect both the economic and natural wellbeing of the area. As research has shown, it is important that all members of the community are involved in this process. The goals of the Etowah involvement and education program include motivating and encouraging participation in the Etowah HCP as well as other local environmental issues, and the results of the Etowah public environmental survey have provided insight and direction that will help to accomplish this goal.

In this chapter, I discuss the implications of the survey results and make recommendations for the Etowah public involvement and education program. The Etowah public environmental survey provides useful information about residents' knowledge, opinions, and sense of empowerment about local environmental issues. This information will continue to guide the development and implementation of the Etowah education program. The results of the Etowah survey also provide useful information about methods of communicating with the public, including education in schools. In this chapter, I also discuss environmental education and democratic service learning in schools as important components to the Etowah program. Environmental education and democratic service learning in schools provide students with the learning atmosphere and experiences they need to become responsible, participatory members of their community.

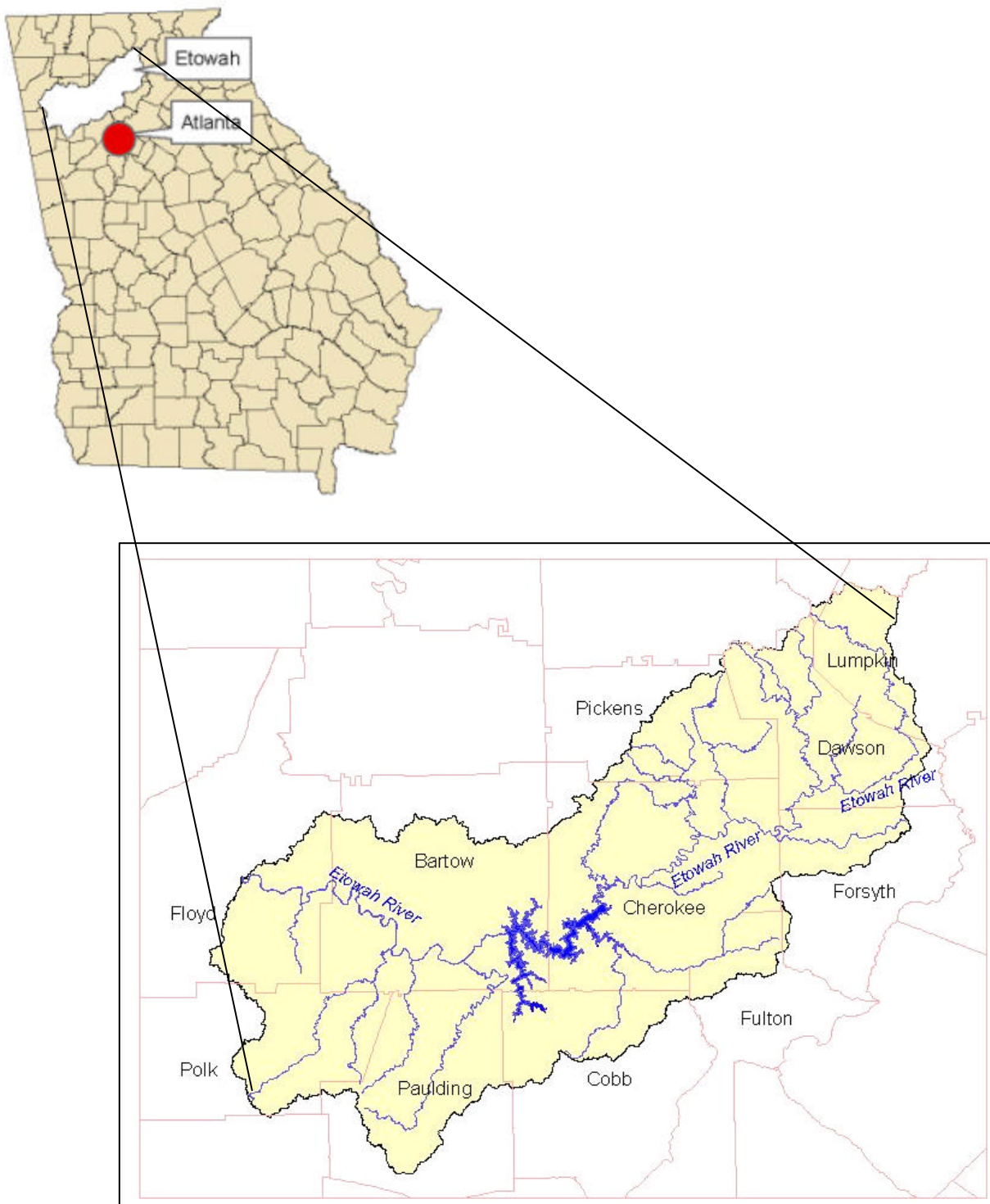
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APPENDIX A: MAP OF THE ETOWAH WATERSHED



## APPENDIX B: THE ETOWAH PUBLIC ENVIRONMENTAL SURVEY

## The Nature Conservancy/UGA Institute of Ecology Etowah River Basin Survey

*Introduction*

Hello, my name is..... I am calling on behalf of The University of Georgia Public Service and Outreach Program which is conducting a survey about public interest in environmental issues in the Etowah River Basin. As a citizen of this area, your opinion is important to us, and we would like to ask you a few questions. The participant must be 18 years or older. If you are not, is someone available who is 18 years or older?

Before we begin, let me assure you that all information that you provide will be kept strictly confidential. Participation in this survey is completely voluntary and you can skip any questions you don't want to answer.

Can we take just a few minutes to ask you a few questions?

1. No
2. Busy/Not convenient
3. Yes

*(If respondent answers "1" or "2," the interviewer will have the chance to arrange for a callback time. If respondent says "yes," survey will proceed to "County.")*

What county do you live in?

1. Bartow
2. Cherokee
3. Cobb
4. Dawson
5. Floyd
6. Forsyth
7. Fulton
8. Lumpkin
9. Paulding
10. Pickens
11. Polk
12. Other

*(The next two questions are used to pick an adult at random if more than 1 adult lives in the household.)*

In order to make sure we have a representative sample of people in your area, I need to know how many people 18 years of age or older currently live at this residence?

From these (\*# of adults is inserted here\*) adults, I need to interview the one with the NEXT BIRTHDAY. Are you that person, or is that person available? (Again, this is to make sure I get a random sample of adults.)

1. No
2. Busy/can't come to phone
3. Speaking
4. Yes - just a minute

*(If the person we are talking to is the adult with the next birthday, then we go into the body of the survey. If another adult is needed, we ask to speak to that person. If person is unavailable or unwilling to cooperate at this time, we arrange for a callback. If person comes to the phone, we re-introduce ourselves using the same text (above) and seek permission to do the survey.)*

*(The following is the body of the survey.)*

**1**

Are you aware that you live near the Etowah River Basin?

1. Yes
2. No
3. DK
4. NA

**2.1 - 2.8**

For each of the following items, please indicate whether they would be VERY EFFECTIVE, SOMEWHAT EFFECTIVE, or NOT EFFECTIVE methods of providing you with information about issues related to the Etowah River Basin...

*(This question will be asked for each of the following items)*

1. TV or Radio announcements
2. Newspaper ads or articles
3. Awareness posters, brochures, or flyers
4. Public meetings, seminars, or lectures
5. Signs posted along the Etowah River
6. Education in school
7. Personal E-mail
8. Internet Website

**2.9**

You said each of the following forms of communication would be VERY EFFECTIVE methods of providing you with information about the Etowah River Basin...

<Read list if relevant>

Which of these methods would be the MOST EFFECTIVE way to reach you with this information?

**3.1 - 3.4**

In the past year, have you engaged in any of the following activities in an attempt to influence people's opinions or actions on any matter of public policy?

Have you...(each item will be asked and coded yes or no.)

1. Attended a county commission, planning commission, or city council meeting?
2. Written or spoken with a public official?
3. Signed a petition regarding a particular issue?
4. Written a letter to the editor of a newspaper?

#### 4.1

Are you currently active in any environmental organizations?

*(If respondent says "Yes," ask him/her to specify which groups and code accordingly...)*

1. No
2. Yes, Upper Etowah River Alliance
3. Yes, Lake Allatoona Preservation Authority
4. Yes, Audobon Society
5. Yes, Nature Conservancy of Georgia
6. Yes, Upper Chattahoochee River
7. Yes, Altamaha River Keeper
8. Yes, Georgia Conservancy
9. Yes, Georgia Wildlife Federation
10. Yes, Other specific organization mentioned
11. Done/No More

#### 5.1

Which of the following constraints is the biggest obstacle to you becoming more involved in efforts to improve environmental conditions in your community? Is it...

1. Lack of time
2. Lack of money
3. Lack of interest or desire
4. Lack of information about how you can get involved?
5. (Respondent Offers) Other
6. DK/NA

#### 6.1

How interested are you in issues of public policy affecting your county? Would you say you are...

1. Very interested
2. Somewhat interested, or...
3. Not interested... in these matters
4. DK/NA

*Please tell me if you STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE with each of the following statements*

"What is the source of your home's drinking water?"

1. Lake Lanier
2. the Etowah River
3. the Chattahoochee River
4. Lake Allatoona
5. groundwater/well water
6. (Respondent offers) Other
7. DK/NA

**8**

"Continued urban and suburban expansion is essential to the economic health of the region." Do you...

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree
5. (Respondents Offers) Neutral -
6. DK/NA

**9**

"It is important for me to help educate others about the impact of their activities on the water quality in the Etowah River Basin." Do you...

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree
5. (Respondents Offers) Neutral -
6. DK/NA

**10**

"Some special-interest groups exaggerate the threats to the water quality of the Etowah River Basin." Do you...

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree
5. (Respondents Offers) Neutral -
6. DK/NA

**11**

"Preservation of rivers and streams in the Etowah River Basin requires the continuous efforts of everyone in our local communities." Do you...

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree

- 5. (Respondents Offers) Neutral -
- 6. DK/NA

**12**

"Local governments should restrict development in some areas to protect fish and other aquatic life." Do you...

- 1. Strongly Agree
- 2. Agree
- 3. Disagree
- 4. Strongly Disagree
- 5. (Respondents Offers) Neutral -
- 6. DK/NA

**13**

"Some damage to rivers and streams is an acceptable cost of economic growth." Do you...

- 1. Strongly Agree
- 2. Agree
- 3. Disagree
- 4. Strongly Disagree
- 5. (Respondents Offers) Neutral -
- 6. DK/NA

**14**

"Restricting what people can do with their land is a violation of property rights." Do you...

- 1. Strongly Agree
- 2. Agree
- 3. Disagree
- 4. Strongly Disagree
- 5. (Respondents Offers) Neutral -
- 6. DK/NA

*We have some questions now about issues related to the water quality in the Etowah River Basin...*

**15**

Would you say the water quality of the streams and rivers in the Etowah River Basin is...

- 1. Excellent
- 2. Very Good
- 3. Good
- 4. Fair, or...
- 5. Poor?
- 6. DK/NA

**16**

Over the next 5 to 10 years, will the water quality in the Etowah River Basin...

- 1. get a WHOLE LOT BETTER

2. get a LITTLE BIT BETTER
3. get a LITTLE BIT WORSE
4. get a WHOLE LOT WORSE...?
5. (RESPONDENT OFFERS) Will stay about the same...
6. DK/NA

### 17.1 – 17.8

For each of the following items, please indicate if you believe they are a VERY SERIOUS threat, a SOMEWHAT SERIOUS threat, or NOT A SERIOUS THREAT to the water quality in the Etowah River Basin.

What about...

*(Question will be asked for each of the following items.)*

1. Trash left by visitors (...as a threat to the water quality)
2. Agricultural runoff
3. Industrial waste
4. Fertilizer runoff from yards and lawns
5. Erosion and sediment build-up
6. Discharges from wastewater treatment plants
7. Stormwater runoff
8. Leaking septic tanks

### 18.9

You said you believe the following problems are VERY SERIOUS threats to the water quality in the river basin.

*(READ LIST BELOW....(will vary in length from respondent to respondent))*

.  
.  
.

Which of these do you believe is the MOST SERIOUS THREAT to water quality in the river basin?

### 19

"Buffer areas along streams and rivers are important to help protect the habitat of fish and other aquatic life." Do you...

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree
5. (Respondents Offers) Neutral -
6. DK/NA

### 20

"The actions of people who live upstream in the Etowah River Basin can have a serious impact on the water quality for those who live downstream." Do you...

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree
5. (Respondents Offers) Neutral -
6. DK/NA

**21**

"The Endangered Species Act is too restrictive to land owners." Do you...

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree
5. (Respondents Offers) Neutral -
6. DK/NA

**22**

"Diversity of fish and other aquatic life is essential to the health of the Etowah River Basin." Do you...

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree
5. (Respondents Offers) Neutral -
6. DK/NA

**23.1 – 23.5**

Please tell me if you would be VERY SUPPORTIVE, SOMEWHAT SUPPORTIVE, or NOT SUPPORTIVE AT ALL of the following policies if they were adopted by your local government....

What about... (*Question will be asked for each of the following items.*)

1. A greenspace plan to purchase undeveloped land to protect forests and pastures.
2. A regional development plan that both protects endangered species' habitat and allows for future growth.
3. Stricter regulations on future development to control stormwater run-off and protect the water quality of the river basin.
4. Required maintenance or inspection of septic systems to reduce water pollution.
5. Increasing the size of buffer areas along streams and rivers in the Etowah River Basin.

**24**

In your opinion, which of the following is the MOST IMPORTANT reason we should seek to protect the water quality of the streams and rivers in your community? Would the most important reason be to...

(The response set will be randomly ordered for each respondent)

1. protect property values along the river basin
2. protect the quality of the drinking water
3. maintain the natural beauty associated with clean waters
4. provide safe swimming, boating, and other recreational activities
5. provide a good fishing environment
6. protect the aquatic life in the river basin
7. (RESPONDENT OFFERS) Other...(specify)
8. DK/NA

## 25

In your opinion, which of the following governmental agencies should be responsible for setting policies regarding environmental issues in the Etowah River Basin? Should it be the responsibility of...

1. the Federal Government
2. the State Government, or...
3. the Local Government?
4. (RESPONDENT OFFERS) Federal and State
5. (RESPONDENT OFFERS) Federal and Local
6. (RESPONDENT OFFERS) Local and State
7. (RESPONDENT OFFERS) All three - Federal, State and Local
8. DK/NA

## 26

Are you familiar with any organizations or agencies that are responsible for monitoring and developing long-range plans to protect the Etowah River Basin?

*(Interviewer: If "yes", check any that R mentions.)*

1. No
2. Yes - Lake Allatoona Preservation Authority
3. Yes - Upper Etowah River Alliance
4. Yes - U. S. Army Corps of Engineers
5. Yes - State Dept. of Natural Resources (DNR)
6. Yes - Environmental Protection Division (EPD)
7. Yes - U. S. Environmental Protection Agency (EPA)
8. Yes - other specific organization mentioned
9. DK/NA

*For background purposes, we would like to ask you a few questions about yourself. Please remember that this information will be used for research purposes only, and your individual responses will remain confidential...*

## Dwelling

In regards to your home, do you live in...

1. An apartment
2. A condominium, duplex, or other multi-family dwelling
3. A mobile home, or...
4. A single-family house
5. (Respondent Offers) Other (specify)

6. DK/NA

**Ownrent**

Do you own your own home, or are you renting the place where you live?

1. Own
2. Rent
3. DK/NA

**Residence**

How long have you lived at your current residence?  
(Code number of years. Code <1 = 0. DK/NA = 99.)

**Employment**

Which of the following best describes your employment situation?  
Are you...

1. A full time "homemaker"
2. Employed full-time outside the home
3. Employed part-time outside the home
4. Self-employed
5. Unemployed, or...
6. Retired
7. (Do not read) Retired on disability
8. DK/NA

**Race**

Are you...

1. African-American
2. Hispanic
3. Caucasian
4. Asian, or...
5. Native American
6. (Do not read) Multi-racial
7. (DO NOT READ) Other
8. DK/NA

**YearBorn**

In what year were you born?  
(Code actual year of birth. DK/NA - 1999.)

**Education**

What is the highest level of education you completed?

1. Grades 1-11 (did NOT graduate High School)
2. 11 or 12th grades (DID graduate from high school)
3. Some college (did NOT receive a BA or BS)
4. College Graduate (BA or BS)
5. Graduate/Professional School (MA, MS, Ph.D., JD, MD, etc.)

6. Technical/trade schooling
7. Refused
8. DK

**Income**

I am going to read a number of income categories that might represent your total household income in 2001. Please stop me when I get to the income category that describes your total household income for last year. Was it...

1. Under \$15,000
2. \$15K - \$25K
3. \$25K - \$50K
4. \$50K - \$75K
5. \$75K - \$100K
6. \$100K - \$150K
7. Over \$150K
8. Refused
9. DK/NA

**Gender**

(Interviewer: Code by voice: 1 = Male 2 = Female)

*Conclusion*

*Thank you very much for your time. If you have any questions, please phone (706)542-4244 or (706) 542-3199.*

APPENDIX C:  
APPLICATION AND APPROVAL FORM FOR APPROVAL OF RESEARCH WITH HUMAN  
RESEARCH PARTICIPANTS

## Application for Approval of Research with Human Research Participants

1. **Problem Abstract:** The Etowah River Basin in North Georgia is one of the most diverse river systems in the United States, with 91 native fish species and numerous species of mussels. Several fish, mussel, and caddisfly species in the basin are federally protected, state protected, or are likely candidates for federal listing. Essential habitat for all these species is threatened by extremely rapid development associated with the greater Atlanta metropolitan area. The rate of habitat loss is such that species extirpations and even distinctions appear possible in coming decades, if growth is not managed properly. In 2001, the U. S. Fish and Wildlife Service awarded a Habitat Conservation Plan Assistance grant to an interdisciplinary team of scientists, lawyers, educators and policy analysts to begin development of a comprehensive Habitat Conservation Plan (HCP) for the imperiled aquatic species of the Etowah River Basin. A baseline telephone survey was developed to determine the level of public knowledge on biodiversity in general and the imperiled species of the Etowah in particular, as well as attitudes toward these issues. Two major research questions are addressed through the survey:

Question One: What is the level of public knowledge on biodiversity in general and the imperiled species of the Etowah River Basin in particular?

Question Two: What is the attitude of the general public toward natural resources and environmental protection in the Etowah River Basin?

In the Etowah basin, scientists believe the greatest threat to protected species is suburban and urban growth. The goal of the HCP is not to stop growth, but to ensure that the growth does occur has a minimal impact on water quality and aquatic habitats. This survey is important because baseline information is necessary in order to create appropriate education and outreach programs designed to inform and engage the public in creating a healthy aquatic ecosystem in the Etowah River Basin.

2. **Design:** The design for this study is quasi-experimental. Baseline surveys are useful in that they are systematic, representative, objective and quantifiable. In collaboration with the Georgia Conservancy, thirty survey items designed to answer the two research questions were designed to be user-friendly (e.g., simple format, ease in answering, time involved). Frequency analysis will be presented in a written report available to the public. The targeted number of research participants is 1000 adult residents of the Northeast Georgia River Basin.

### 3. **Research Participants:**

a. There will approximately 1000 adult (18 years or older) participants representing both genders in this study.

b. Method of selection and recruitment- The telephone survey will be conducted by the A.L. Burruss Institute of Public Service, Kennesaw State University, Kennesaw, GA (770) 423-6464. A random sample of telephone numbers within the counties of Fulton, Cobb, Cherokee, Dawson, Lumpkin, Forsyth, Pickens, Bartow, Paulding, Polk and Floyd Counties will be provided by Survey Sampling, Inc., of Fairfield, Connecticut. When more than one adult resides in any given household, a random selection process will be

used to maintain the randomness of the sample. The average survey will last approximately 12 minutes.

There is no working relationship between the researcher and the participants/subjects.

c. There are no incentives, follow-ups, or compensations for participation in this study.

4. Procedures: Upon answering the phone, each respondent will be asked if they have approximately 12 minutes to engage in a telephone survey about public interest in environmental issues in the Etowah River Basin. They will be told that as a citizen of this area, their opinion is important and confidentiality will be assured. Following consent, 30 items will be asked of each participant. In addition, demographic characteristics will be collected at the conclusion of the phone survey. Answers will be paper-coded as respondents answer items. Following are the exact procedures:

“Hello, this is (SAY YOUR NAME) from Kennesaw State University. We've been asked to talk to people in your community about environmental issues in the Etowah River Basin. As a citizen of this area, your opinion is important to us. I would like to assure you that this is not a sales call. We are calling on behalf of the University of Georgia Public Service and Outreach Program, and your responses are completely confidential. Can we take just a few minutes to ask you a few questions?”

1. No
2. Busy/Not convenient
3. Yes

(If respondent answers “1” or “2”, the interviewer will have the chance to arrange for a callback time. If respondent says “yes,” survey will proceed to “County.”)

“What county do you live in?”

1. Bartow
2. Cherokee
3. Cobb
4. Dawson
5. Floyd
6. Forsyth
7. Fulton
8. Lumpkin
9. Paulding
10. Pickens
11. Polk
12. Other

(The next two questions are used to pick an adult at random if more than 1 adult lives in the household.)

“In order to make sure we have a representative sample of people in your area, I need to know how many people 18 years of age or older currently live at this residence?”

From these (\*# of adults is inserted here\*) adults, I need to interview the one with the NEXT BIRTHDAY. Are you that person, or is that person available? (Again, this is to make sure I get a random sample of adults)

1. No
2. Busy/can't come to phone
3. Speaking
4. Yes - just a minute

*(If the person we are talking to is the adult with the next birthday, then we go into the body of the survey. If another adult is needed, we ask to speak to that person. If person is unavailable or unwilling to cooperate at this time, we arrange for a callback. If person comes to the phone, we re-introduce ourselves using the same text (above) and seek permission to do the survey.)*

5. Materials: The telephone survey is entitled *The Nature Conservancy/UGA Institute of Ecology Etowah River Basin Survey*. The survey is attached to this proposal.

6. Risk:

Current Risk: Participation in the telephone survey will not be coerced. In addition, participants may elect not to answer questions. As such, no psychological, social, legal, economic or physical discomfort, stress or harm is anticipated.

Future Risk: Participants will be assured that participation is confidential and only the researcher will see the actual response of the research participants. Raw data will be housed in the researcher's locked file cabinet.

7. Benefit:

a. Potential beneficial effects on participants in this research include increased awareness of biodiversity and the imperiled species of the Etowah River Basin.

b. Potential benefits for humankind as a result of this research include public participation in the creation of a healthy aquatic ecosystem in the Etowah River Basin of Georgia as well as greater understanding of the effects of human impact on the environment.

8. Consent Process: The consent process includes a verbal agreement to participate in the random telephone survey. In addition, each participant will be informed that their responses are confidential and individual answers will not be reported or identifiable in the report.

9. Vulnerable Participants: No vulnerable participants are anticipated.

10. Illegal Activities: The data does not relate to illegal activities.

11. The activity in this application involves the A.L. Burruss Institute of Public Service at Kennesaw State University, Kennesaw, GA. The Institute will be conducting the phone survey and has received IRB clearance from that institution.



Office of The Vice President for Research  
DHHS Assurance ID No. : M1047

Institutional Review Board  
Human Subjects Office  
606A Graduate Studies Research Center  
Athens, Georgia 30602-7411  
(706) 542-6514; 542-3199  
Fax No. (706) 542-5638

### APPROVAL FORM

Date Proposal Received: 2002-07-26 Project Number: H2003-10052-0

Name	Title	Dept/Phone	Address	Email
Dr. P. Elizabeth Pate	MI	Elementary Education 427 Aderhold Hall +7122 542-4244		epate@coe.uga.edu

Title of Study: A Study of Environmental Attitudes

45 CFR 46 Category: Administrative 2

Modifications Required for Approval and Date Completed: 2002-08-16  
Application, consent form, questionnaire & title change.

Approved : 2002-08-16 Begin date : 2002-08-16 Expiration date : 2003-08-15

*NOTE: Any research conducted before the approval date or after the end data collection date shown above is not covered by IRB approval, and cannot be retroactively approved.*

Number Assigned by Sponsored Programs:  
10-31-RE271-348

Funding Agency:  
US Fish and Wildlife Service

Form 310 Provided: No

Your human subjects study has been approved as indicated under IRB action above.

Please be aware that it is your responsibility to inform the IRB . . .

. . . of any adverse events or unanticipated risks to the subjects or others within 24 to 72 hours; . .

. . . of any significant changes or additions to your study and obtain approval of them before they are put into effect; . . .

. . . that you need to extend the approval period beyond the expiration date shown above; . . .

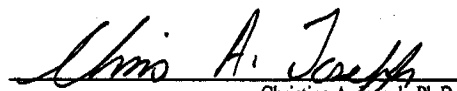
. . . that you have completed your data collection as approved, within the approval period shown above, so that your file may be closed.

For additional information regarding your responsibilities as an investigator refer to the IRB Guidelines.

For your convenience in obtaining approval of changes, extending the approval period, or closing your file, we are providing you with a blue Researcher Request form. Detach this blue form, complete it as appropriate, sign and date it, then return it to the IRB office. Keep this original approval form for your records.

Copy:

Dr. Judith C. Reiff

  
Christina A. Joseph, Ph.D.  
Chairperson, Institutional Review Board



Office of The Vice President for Research  
DHHS Assurance ID No. : M1047

Institutional Review Board  
Human Subjects Office  
606A Graduate Studies Research Center  
Athens, Georgia 30602-7411  
(706) 542-6514; 542-3199  
Fax No. (706) 542-5638

## RESEARCHER REQUEST FORM

**Request Date:** 2002-07-26    **Project Number:** H2003-10052-0

Name	Title	Dept/Phone	Address	Email
Dr. P. Elizabeth Pate	MI	Elementary Education 427 Aderhold Hall +7122 542-4244		epate@coe.uga.edu

**Title of Study:** A Study of Environmental Attitudes

**45 CFD Category:** Administrative

**Renew :** No

**Change(s) :**

**Approved :** 2002-08-16    **Begin date :** 2002-08-16    **Expiration date :** 2003-08-15

*NOTE: Any research conducted before the approval date or after the end data collection date shown above is not covered by IRB approval, and cannot be retroactively approved.*

**Number Assigned by Sponsored Programs:**  
10-31-RE271-348

**Funding Agency:**  
US Fish and Wildlife Service

**Form 310 Provided:** No

### *Attention, Principal Investigator!*

The major investigator must complete and return this form  
on or before the approval end date shown above.

1. See Reverse                      For approval of changes you must complete and sign the back of this form. (Also attach a copy of any revised instruments or consent forms, with changes highlighted, where applicable.)
2. See Reverse                      For an extension of the approval period you must complete and sign the back of this form.
3. See Reverse                      Data collection has been completed as approved by the IRB, and this file can now be closed. Federal laws & UGA policies require notification of completion of data collection.

**CONTINUING REVIEW OF APPROVED RESEARCH PROJECT**

Federal Policy requires that IRBs continue to review approved projects at intervals appropriate to the degree of risk but not less than once a year. Please complete the following questionnaire and return it as soon as possible. The IRB must have this form signed and completed to approve changes or the continuation of this study.

1. Is this research still being conducted?  
 YES                      If yes, please answer the following questions.  
  
 NO                         If No, please sign below.
2. Have there been any changes in your subject population (numbers, age, gender, race, etc.)?  
 YES                        If yes, provide complete information on changes.  
  
 NO
3. How many subjects have been accrued? \_\_\_\_\_.
4. Have any participants dropped out of the study?  
 YES                        If yes, what reasons were given?  
  
 NO
5. Have there been any adverse events or unanticipated risks to the subjects or others?  
 YES                        If yes, explain in detail.  
  
 NO
6. Have there been any complaints about the research?  
 YES                        If yes, provide complete information on complaints made.  
  
 NO
7. Have the procedures, materials or consent document(s) changed in any way from the protocol that was last approved by the IRB?  
 YES                        If yes, provide complete information on changes in the form of an addendum and provide a copy of the revised document(s).  
  
 NO
8. Is contact information on the front of this sheet correct?  
 YES                        If no, provide current information by correcting the front of this form.  
  
 NO
9. I wish to extend my approval period through \_\_\_\_\_.
10. Consent form attached? It is federally required to submit current consent forms for continuing review even if there have been no changes.  
 YES  
  
 NO                        If no, please explain.

Researcher's Signature \_\_\_\_\_ Date \_\_\_\_\_

**INCOMPLETE SUBMISSIONS MAY BE INACTIVATED BY THE IRB**