MAKING SPACE FOR ENVIRONMENTAL PROBLEM SOLVING: A STUDY OF THE ROLE OF "PLACE" IN BOUNDARY CHOICES USING GEORGIA'S STATEWIDE PLANNING PROCESS AS A CASE

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SUMMARY

In this dissertation, the concept of "problem bounding," argued by Bryan Norton and colleagues to be an important but understudied aspect of environmental problem solving, is operationalized and empirically investigated. The empirical part of the work involves participant observation and survey research on how diverse individuals – all of whom were invited by a state agency to advise the development of an institutional framework for statewide water planning – engaged in problem bounding both conceptually and in their choice of a spatial structure for ongoing water management. My particular focus is on the multiple ways in which the "place" an individual views the problem from shapes the way they engage in problem bounding. Although more research is needed and there are significant limitations to the data, my findings indicate that place – particularly in terms of location on an upstream/downstream continuum and rural/urban self-identification – does play a role in problem bounding. The dissertation concludes with a review and discussion of the major findings, and implications for the development of institutional frameworks that are both responsive to ecological dynamics and representative of the relevant public(s).

INTRODUCTION

Identifying environmental problems, and solving them, entails the simplification of multiple forms of complexity. A fundamental means of simplifying the complexity of environmental problems and managing them over time is the act of creating boundaries. The most basic function of a boundary is to separate or distinguish what is "inside" the boundary from what is "outside." Boundaries can take the form of abstract concepts that function to analytically organize what might otherwise be an unintelligible informational morass. Or, boundaries can take the form of lines drawn on a map as means to guide planning efforts, or for the application of political or administrative power. In either case, our choice of the kinds of boundaries that will be used to simplify and structure the complexity of the environment and its problems has dramatic significance for how those problems will unfold over time, as well as for the social and political dynamics with which they are interrelated.

An obvious place to look for guidance in making wise choices about boundaries for structuring our attempts to solve environmental problems is ecology and related scientific disciplines. However, given the social context of environmental problems, ecological boundaries that are assigned planning or administrative power may not always be immediately meaningful to the people whose lives and livelihoods will be constrained by them. While this may be partially allayed by public education, it may also be important - to the extent that boundaries shape the distribution of power and resources - to consider the utility of various boundary choices in achieving shared ideals of fairness and representative democracy.

In this dissertation, I focus on understanding boundary choices from the perspective of stakeholders and decision-makers engaged in a specific planning endeavor with the overall goal of better understanding the role of boundaries in simplifying the complexity of environmental problems and shaping public policy. The study is divided into three chapters.

In Chapter 1, I describe how the complexity of environmental problems necessitates judgment in choosing boundaries, and build on the work of Bryan Norton and others to define and operationalize a concept of *problem bounding*. Two sub-concepts, *conceptual and managerial problem bounding*, are developed, and the research is situated within relevant literature in the cognitive and policy sciences. The issues of problem bounding in the environmental policy process are illustrated and discussed by way of specific examples, and a case is made for the importance of examining problem bounding from the point of view of interested and affected stakeholders who represent, among other forms of diversity, different places.

In Chapter 2, the specific context in which the ideas are empirically explored is described – the Georgia state water planning process - and a model is developed that links basic stakeholder characteristics, in particular ones' "place" in the system as conceived in two distinct ways, with problem bounding. Also in Chapter 2, hypotheses generated by the model are explicated, and the results of participant observation and survey research are presented and discussed.

In Chapter 3, the empirical contributions of the first two chapters are drawn on to discuss implications pertaining to the design of institutions that “make space” for environmental problem solving. Three types of implications of the research are explored: 1) implications for achieving authentic representation in deliberative environmental policy processes; 2) implications for defining the roles and responsibilities of environmental management institutions; and 3) implications for the design of environmental policy mechanisms that are responsive to the spatial and scalar dimensions of environmental problems.

CHAPTER 1

BOUNDING COMPLEXITY

1.1 Overview of Chapter 1

In Chapter 1, closer attention to the process of "problem bounding" in environmental policy analysis and development is called for in light of the complex nature of environmental problems and problem solving. The concept of problem bounding in general and the two dimensions of problem bounding that will be the subject of research – conceptual and managerial bounding - are defined and illustrated by way of examples and linked to the relevant literatures and issues in the cognitive and policy sciences. The importance, and limitations, of using ecological models to bound environmental problems are discussed, also by way of a specific example, and the case is made for increased attention on the way not only scientists and other experts, but also interested and affected stakeholders engage in problem bounding. Finally, a possible role for place, conceived in two separate ways, in shaping problem bounding by stakeholders is articulated.

1.2 Characterizing Environmental Problems as Complex

The dynamics that give rise to environmental problems are multiple and often diffuse, constantly in flux, and full of inseparable interdependencies. The most pressing environmental problems, problems like water pollution, urban sprawl, and climate change, defy existing political and economic boundaries (Hajer 2003; Chester 2006) and invoke the interest and passionate attention of stakeholders located at diverse places across multiple spatial scales (Norton and Ulanowicz 1992; Norton 1995; Gibson, Ostrom et al. 2000; Lovell, Mandondo et al. 2002; Cheng and Daniels 2005; Norton 2005). Furthermore, the technical dynamics of environmental problems – which include indirect effects, positive and negative feedback, dynamic equilibrium, and threshold effects – resist easy scientific modeling, and defy prediction and linear attributions of cause and effect (Patten 1981; Patten in preparation).

In a word, environmental problems – the interesting and challenging ones at least - are *complex* (Funtowicz and Ravetz 1994; Liu, Dietz et al. 2007). Of the many ways to define complexity, the most useful here will be that of Funtowicz and Ravetz and colleagues, who point to two defining characteristics of complexity: *irreducible uncertainty* and the simultaneous existence of a *multiplicity of legitimate perspectives* (Funtowicz and Ravetz 1994; Funtowicz and Ravetz 1995; Funtowicz, Martinez-Alier et al. 1999).

Irreducible uncertainty means that every attempt at understanding a complex system, even the most technical and scientific, is necessarily partial and subject to revision. Multiplicity of perspectives means that every attempt at understanding a complex system comes from a particular place, at a particular time, along with a particular way of understanding the world, and in many cases with a particular set of objectives in mind (Levin 1992; Ulrich 1998; Ulrich 2003). The idea that each perspective is legitimate means that there is no objective way of asserting that a particular perspective is "right", and therefore that no single system of values and valuation will be sufficient in and of itself for prioritizing goals and managing the system (Norton and Steinemann 2001; Norton 2005).

1.3 Simplification of Complexity Through Problem Bounding

A basic strategy for dealing with complex problems is to define boundaries. In their most basic sense, boundaries are demarcations between entities and their surroundings (Varzi 2008). Defining boundaries allows those who are trying to understand, model, or make crucial decisions about environmental problems to focus on certain dynamics and leave others out. In this sense, defining boundaries is an adaptation for dealing with the irreducible uncertainty of complex problems. At the same time, however, the fact that there often exist a variety of legitimate perspectives on complex environmental problems means that setting boundaries is inevitably a subjective process that involves privileging some views over others and perhaps "bounding" some out of consideration altogether. In the words of Hoffmann, "setting boundaries is at the same time a necessity in the face of overwhelming complexity, and a dangerous limitation for our thinking and acting" (Hoffmann 2007).

In several of his writings (Norton 1995; Norton 2005) and work with colleagues (Norton and Ulanowicz 1992; Norton, Hirsch et al. In Process), Norton refers to the "problem of problem bounding." In grappling with the multi-scalar nature of environmental problems, Norton posits that choosing the boundaries within which environmental problems will be understood and managed is first and foremost a social process, one that is a function of values, interests, and perception. To the extent that problem bounding is viewed as a scientific problem *only*, then important decisions about values, identity, and culture may end up being assumed away without adequate reflection. Norton therefore advocates making problem bounding a conscious, reflective, and deliberative process – one that is engaged in by scientists, policy-makers, and the people affected by environmental problems. Until now, there has not been an attempt to operationalize Norton's concept of problem bounding and explore it empirically.

1.4 Operationalizing Problem Bounding

Problem bounding can be both an abstract and a concrete process. At its most abstract, the basic metaphors we use to understand and describe environmental phenomena are a form of problem bounding. To explain further, it will be useful to draw on a canonical example. In a short essay, "Thinking Like a Mountain," Aldo Leopold describes his misguided attempts to increase deer availability for hunting by exterminating wolves in the Southwestern US. His "experiment" taught him that loss of wolves resulted in an explosion of the deer population, denuding of mountainside vegetation, and an eventual crash in the deer population coupled by erosion of the mountainside ecosystem as a whole.

When Aldo Leopold encouraged future land managers to learn from his mistakes and "Think Like a Mountain" (Leopold 1949, 1966) he was offering a new metaphor – the mountain - for expanding the spatial and temporal boundaries within which future wildlife management decisions should be made. Along with this new metaphor came a shift in his understanding of the problem drivers (from wolf predation to deer overpopulation), in his intentions and goals (from maximizing deer hunting to preventing mountainside erosion) and in his strategies for achieving those goals (from killing wolves to managing deer). Table 1, below, illustrates the elements of Leopold's "conceptual bounding" (defined below of the system in question.

Table 1. Changes in Leopold's Conceptual Bounding

Problem Drivers Old: wolf predation New: deer overpopulation	**Goals** Old: maximizing hunting New: prevent erosion
Strategies Old: exterminate wolves New: manage deer	**Underlying Metaphors** Old: competition between wolves and man New: the mountain

While Leopold's influence did not extend to the development of new environmental management jurisdictions based on the spatial extent of mountains, had such jurisdictions emerged they would have represented concrete manifestations of the conceptual changes he helped bring about. This would have corresponded to the idea of "managerial bounding," defined below.

This simple canonical example, and its hypothetical extension from problem bounding in an abstract sense, through the adoption of new metaphors and models, on through the development of new jurisdictional boundaries, can be used to operationalize a set of problem bounding definitions that will be useful for a variety of empirical applications.

Problem bounding *is the process of simplifying complexity by distinguishing what is included in a given problem definition from what is excluded.*

Conceptual bounding *is the process of simplifying complexity through: the adoption of an underlying metaphor; the identification of problem causes or affected parties; the articulation of goals for intervention; and/or the selection of strategies for achieving those goals.*

Managerial bounding *is the process of simplifying complexity by structuring physical and/or institutional space for the purposes of environmental planning and/or management.*

Below, two strategies are used to flesh out these basic elements of a problem bounding and "give it roots." The first strategy to develop the theory of problem bounding will be to link it to relevant theoretical perspectives in the literature of the cognitive sciences, discourse theory, and institutional choice and design. The second strategy will be to use specific examples to illustrate 1) how different researchers, as well individuals and groups with different interests and views of the world, may engage in problem bounding in quite different ways, and 2) how the way a problem gets bounded can have important impacts on the way it is approached and intervened in (or not). These examples will illustrate the importance of studying problem bounding from the "bottom-up" and set the stage for an analysis of the role of "place" in problem bounding.

1.5 Linking Problem Bounding to Related Ideas in the Policy Sciences

The notion of problem bounding can be linked to several concepts in the policy sciences. First and most basically, the notion of problem bounding can be seen in the light of Simon's general notion of "bounded rationality" which posits that we selectively attend to portions of complex systems as a function of our limited cognitive abilities and the constraints imposed by pre-existing institutions (Simon 1947; Simon 1982; Jones 2003). Second, the idea of problem bounding can be linked to the literature on "mental models" (Bostrom, Morgan et al. 1994; Doyle and Ford 1998; Johnson-Laird 2000) and "cultural models" (Quinn and Holland 1987; Kempton, Boster et al. 1996; Paolisso 2002). Mental models can be defined as the network of causal and factual relationships an individual uses in order to understand the flow of perceptions and in order to incorporate new information (Doyle & Ford, 1998; Johnson-Laird, 2000). Cultural models are mental models that associates share, making communication about shared interests and goals possible (Kempton, Boster et al. 1996).

Third, we can link problem bounding to work on "framing" (Tversky and Kahneman 1981; Tversky and Kahneman 1990; Nelson 1999; Gray 2003), which, after reviewing a variety of definitions, Hoffmann defines as "the cognitive process of integrating information we are facing into a given belief system" (Hoffmann 2006). Fourth, problem bounding can be linked to "discourse" as the central concept that mediates people's interpretations of the environment and its problems (Hajer 1995; Dryzek 1997; Sharp and Richardson 2001; Torgerson 2003; Hajer and Versteeg 2005). Hajer defines a discourse as "an ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomena (2005, p. 175). Fifth, problem bounding can be linked to recent work by Schneider and Ingram (Schneider and Ingram 2007) on "ways of knowing", which they describe as a narrative or story that one uses to interpret the elements in a policy space that functions to "hold all of the pieces together in a relatively coherent way" (p. 2).

In developing a notion of problem bounding, it will be useful to consider what these theories have in common. They share in common the basic understanding and acknowledgment that in order to survive living organisms are constantly distinguishing between what is relevant to survival and what can safely be ignored – separating the "figure" from the "background" (Hirsch 2008). Thus, in the face of complexity, humans select only parts of that complexity for conscious consideration, and they do so in a way that is constrained to a greater or lesser extent by the environment, is non-random, and is to a large extent a function of an individual's unique history and experiences, as they are reflected in interests, value commitments, ideologies, goals, etc.

It is also useful to consider briefly how the above-mentioned theories differ, which is in their particular focus and the extent to which individuals are presumed to have conscious choice over the way they perceive and interpret their world. Mental models focus on representations that are internal to the mind; framing can be thought of as a more meta-level process in which particular linguistic or environmental cues (which can of course be manipulated) change the mental model that an individual applies in a given context; discourse and ways of knowing are both centered on the role of language and communication, generally leaving more room for self-reflexivity and conscious choice on the part of the individual. Of course, even within a given theoretical perspective, there can be great diversity on this question, with those who take a Focauldian approach to discourse generally assuming that we are forever stuck in the discourses we inherit (Sharp and Richardson 2001), while others view discourse as something that can be consciously constructed given the right pre-conditions (see, for example, the discussion of Habermas in Norton 2005). Certainly Schneider and Ingram's "ways of knowing" approach represents a move away from more limited concepts of how humans interpret reality – in their view, it is important to recognize that we all have multiple ways of knowing that we have some degree of choice in matching to the situation or problem at hand.

A particularly useful approach within the discourse model is critical systems theory, which originated with the work of Churchman (1979) and was developed and applied by Flood (1998), Midgley (2003), and Ulrich (1998; Ulrich 2000; Ulrich 2003). The basic insight underlying critical systems theory is that any quest to understand a complex system is necessarily partial and selective, and that instead of aiming for some mythical "comprehensive" or "holistic" view of a system, we should recognize our partiality and focus our attention on questioning its character in particular cases. We should ask when and why we – and others – are partial and selective in specific ways when describing a problem or its solution. In particular, we should inquire how ways of defining what belongs to a system of concern and what doesn't – what critical systems theorists call "boundary judgment" - privilege some views, interests, and priorities over others (Ulrich 1998; Ulrich 2000; Ulrich 2003).

The concept of problem bounding is not meant to replace, supersede, or compete with work on bounded rationality, mental and cultural models, framing, and discourse theory. Each, in their own way, incorporates the basic insight that humans are partial in their apprehension of and communication about environmental problems, and each has associated methods and theories for systematically exploring such partiality. The purpose – the added value - of a problem bounding concept is to link the notion of cognitive and communicative partiality about environmental problems with the challenge of developing of institutions for managing them.

Ecologist Simon Levin, writing in the article, "Multiple Scales and the Maintenance of Biodiversity" says, (p. 504) "one of the greatest challenges facing humanity involves the distinct scales of environmental change and human response" (Levin 2000). A notion of problem bounding uses as a starting point the idea that there are multiple ways to describe and bound complex systems in our minds and our communications (as captured by the theories mentioned heretofore) but also builds in the notion that we are engaged in consciously and deliberately shaping our *institutions* to match both our social goals and our evolving understanding of the particular kinds of complexity we face (Norton and Ulanowicz 1992).

The element of deliberate choice in problem bounding links it to the literatures and discussions in the policy sciences relating to the design and development of institutions for managing environmental resources. Denzau and North (p. 4) define institutions as "the external (to the mind) mechanisms individuals create to structure and order the environment"(Denzau and North 1994). Perhaps the most cited scholar on the development of institutions for dealing with environment problems, and of institutional choice and change, is Ostrom, (Ostrom 1990; Ostrom 2005) who seeks to identify "design principles" whereby collective action can be harnessed in a way that sustains rather then depletes the natural systems humans rely on. Ostrom specifically recognizes the central importance of articulating clear and definitive boundaries both for the resource and for the institutions that will manage it.

In the next two sections, two examples are described to illustrate the "problem of problem bounding" and set the stage for the development of subsequent empirical work.

1.6 Problem Bounding Examples

1.6.1 Problem Bounding Example 1: The Case of Environmental Justice

Recent debates over the appropriate boundaries within which to assess claims of environmental injustice exemplify the problem of problem bounding. Claims that environmental injustice is present in a given scenario hinge on evidence that certain sub-sets of the general population (e.g. the poor, a minority group) are disproportionately located in proximity to environmental hazards of some kind. Geographers Hilda Kurtz (Kurtz 2003) and Robert Williams (Williams 1999) point to two ways of thinking about the boundaries of environmental justice problems that are associated with quite different understandings of the essential dynamics of the problems, as well as quite distinct proposals for their resolution. In one way of conceptually bounding the problem, the problem is defined as institutionalized bias and/or racism, the result of which is poor people and minorities unjustly and inequitably bearing the brunt of landfills, toxic dumps, or other environmental "bads." Since institutionalized racism is a pervasive problem that many feel can only be fixed with a regulatory framework that protects vulnerable populations, the appropriate boundaries for managerially bounding the problem as a function of the way it is described are the boundaries of the nation as a whole – the federal level, because only at that level is there capacity to implement and enforce laws and regulatory systems to prevent and ameliorate these injustices.

In the second way of conceptually bounding environmental justice problems as discussed by Williams and Kurtz, the nature of the problem is market forces (the price of labor, the cost of housing, etc.) operating in local contexts. It is not bias, the thinking goes, if a landfill results in reduced property values and the reduced property values mean that more poor people move into an area. The prescription for managerial bounding that emerges from this analysis, if indeed there is anything to do, is to develop solutions at the level of local jurisdictions and communities, or at most at the state level.

Which way is the right way to conceptually bound environmental justice problems? Are claims of environmental injustice just the aggregate accumulation of small-scale processes, or are there forces at work at the national scale such that the public should intervene at the national level? It's hard to say, and it's hard to say because of many issues raised by attempts to delineate boundaries, in this case not just by politicians, activists, corporations, etc., but also by researchers who are trying to model the problem. It turns out that even the basic evidence for the existence or lack thereof of environmental injustice is itself a function of problem bounding choices made by analytical researchers. In a meta-analysis completed by Baden, Noonan, and Turaga (Baden, Noonan et al. 2006), it was determined that whether or not environmental injustice was found to be present in a particular locale was highly dependent on the choice of unit of analysis – zip code, census tract, county, etc.. Thus, claims about the large-scale structural patterns of environmental injustice are tied to problem bounding choices made at the front end of research. This doesn't mean that there is no truth or that research can't help us learn a great deal about problems like this, but it does mean that it is very hard, if not impossible, to avoid making some "judgment calls" in research, and those judgment calls may be linked to values and ideas about what should or shouldn't be done in quite subtle ways.

Several things are apparent from this discussion. First, it should be clear that alternate ways of bounding the problem are strongly linked to particular interests and also ideas about how the world works. Second, it should be clear that the way a problem is conceptually – and, ultimately, managerially – bounded has important implications for what kinds of dynamics are focused on and intervened in, and, ultimately, for issues of fairness and justice. Third, it should be clear that even researchers who use quantitative methods to track the spatial patterns of environmental justice face the problem of problem bounding, in that they must choose a unit of analysis as their starting point, and this choice shapes their results.

1.6.2 Problem Bounding Example 2: Watershed Planning in the Chesapeake

Models developed in the ecological and related sciences are increasingly being used to guide environmental planning and management. Examples of policy boundaries being informed by ecological models include landscape level planning, eco-regional planning, and watershed planning (Brosius and Russell 2003). A great deal of scholarly research has pointed to and discussed the increasing popularity of watershed based approaches to managing, in particular, issues of non-point source pollution (Chess, Hance et al. 2000; Leach and Pelkey 2001; Leach, Pelkey et al. 2002; Koontz and Johnson 2004; Lubell 2004; Weible, Sabatier et al. 2004; Lach, Rayner et al. 2005; Sabatier, Weible et al. 2005). A watershed can be defined as follows: "1) the entire region drained by a waterway that drains into a lake or reservoir; 2) the total area above a given point on a stream that contributes water to the flow at that point; 3) the topographic dividing line from which surface streams flow in two different directions" (Corn 1993).

An oft-cited example of the successful implementation of a watershed-based approach to planning is the set of policies that have emerged to protect the Chesapeake Bay over the past three decades. Going into some detail of this process, in particular those that pertain to problem bounding, will shed light both on the opportunities and limitations of the watershed approach in particular, and the approach of using ecological models to guide planning generally.

The Chesapeake Bay is the largest estuary in the United States, and one of the United States' most productive aquatic ecosystems. Since the late 1960s, the Bay has been in decline – the fish and crustaceans that are such an important part of local and regional economies have been diminishing and the shallow waters, estuaries, and wetlands that constitute the Bay's ecosystems have been compromised. In the late 60s and early 70s, the primary threat to aquatic life was presumed to be sewage outflows from cities, oil spills, or toxic chemicals emitted by nearby industry. In 1977, a 6-year EPA commissioned study, culminating in 1983, concluded that while toxic chemicals were indeed a problem, excess nutrients, primarily from agricultural, urban, and sewage runoff, represented the most significant source of harm to water quality and aquatic life (EPA 1983). In contrast to toxic pollution, which is typically emitted from an identifiable source, harm caused by nutrient pollution is generally the indirect result of activities diffusely spread across a large area, such as run-off from pavement or croplands.

One result of the science that emerged in the late 70s and early 80s was the growing awareness that the spatial scale considered relevant for preserving the integrity of the Bay would need to be drastically expanded. Once nutrient pollution was identified as a significant source of the problem, protecting the Chesapeake no longer meant just reducing the amount of industrial effluent draining into the Bay from factories located on the Bay or just upstream. It now meant controlling nutrient and sedimentary run-off from farming, land development, sewage, auto emissions, etc. into all the streams, tributaries, and rivers located in New York, Pennsylvania, Delaware, West Virginia, Virginia, Maryland, and Washington D.C. – all the states that contain rivers and streams that drain into the Chesapeake (Horton 1987).

The years following the completion of the EPA study marked a shift in the way people engaged in conceptual bounding regarding the Bay system (Horton 1987). This conceptual shift of expanded spatial dimensions necessitated inclusion of a multitude of new stakeholders, and provoked the implementation of a new set of policy solutions and institutions for implementing them, including the multi-state Chesapeake Bay Agreement, initiated in 1983 and revised in 1987 and 2000 (DNR 2005). The Agreement constitutes a new way of managerially bounding the problem, by protecting the bay in the context of its 64,000-acre watershed that covers parts of five states.

There is a great deal to be said for this approach – there is no way to effectively make decisions about environmental problems that are ecological in nature without, at least in some way, including awareness of ecological dynamics and their importance. But is the Chesapeake Bay watershed the "right" way of managerially bounding the Bay? Might there be alternative spatial scales that include dynamics not captured by the boundaries of the watershed? We need look no further than academic ecology to see that this is indeed the case. It is a basic ecological principle that any system of interest - whether a single organism, a species, an assemblage of species, an ecosystem, the global biosphere, or the Chesapeake Bay – is linked to dynamics operating at not just at one but at multiple scales of space and time (O'Neill 1988; Holling 1992; Levin 1992; Gunderson and Holling 2002; Hull, Robertson et al. 2002; Phillips 2005). Thus, just as researchers in the 70s and 80s highlighted the role of nutrient pollution at the watershed scale, researchers in the 90s began to highlight the role of atmospheric deposition of toxins like mercury into the Chesapeake (Mason, Lawson et al. 1997). The appropriate spatial scale within which to consider atmospheric deposition to the Chesapeake is several times larger than the watershed scale (see Figure 1 below). Continuing the trend of scale expansion, this time to the global biosphere, researchers in recent years have begun to identify factors relating to climate change as drivers of negative changes in the Chesapeake Bay (Abler, Shortle et al. 2002).

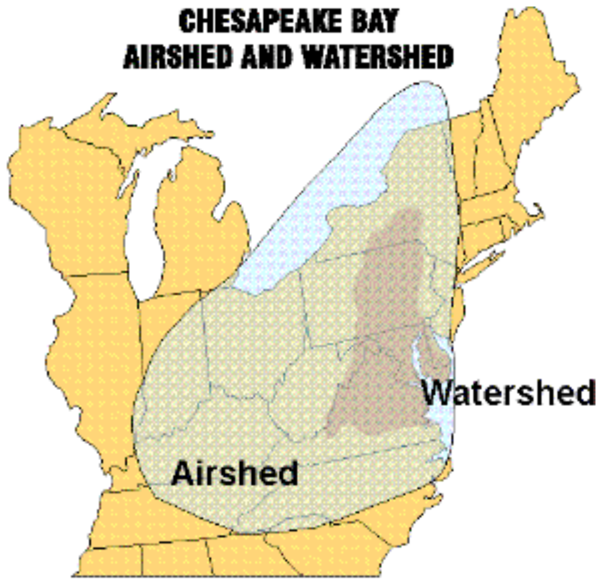


Figure 1. Chesapeake Bay Airshed and Watershed[1]

Several themes should be evident in this example. First, just as ecological models are useful in providing a template for conceptually bounding environmental problems, the nature of ecological inquiry is to continually revise and refine its boundaries of understanding. While ecologists may be comfortable accepting the contingent nature of attributions of system boundaries, the fruits of their continual inquiry can add fuel to controversies. The contingent nature of ecological models may be ripe for exploitation by, for example, Bay fishermen who, not wanting to look at their own overfishing, blame the farmers in Pennsylvania for over-fertilizing, while the farmers, not wanting to question their practices, blame the factories in Ohio, while everyone blames those responsible for climate change be they Americans driving SUVs or Chinese building coal-fired power plants (Gray 2003).

[1] http://www.dnr.state.md.us/streams/acid/page4.html, accessed August 2008

Additionally, ecologists themselves would likely be the first to point out that the point of ecology is not to provide deterministic or reductionist models of cause and effect (Patten 1981; Jorgensen 2002; Patten in preparation). They would also possibly point out that the current, declining community of fish and crustaceans present in the Bay that has such symbolic and financial value should not be thought of as representing some kind of "balance of nature" or "climax" community. On the contrary, it may be one of many multiple states of equilibrium the Bay system can tend to, and these states may be dynamic and shifting along with perturbations or other changes in the larger context (Gunderson and Holling 2002). It may be the case that a new equilibrium state is in the process of emerging in the Bay, one in which other forms of life – perhaps economically productive and culturally interesting ones, and perhaps not – will proliferate. In any case, without a discussion of public values by the people who are both part of the problem and affected by it, ecological models can not in and of themselves tell us in a definitive way what are the "right" set of either conceptual or managerial bounds within which to consider and treat problems in the Chesapeake or elsewhere.

1.7 Exploring Problem Bounding from the "Bottom-up"

These examples should clearly illustrate that understanding and integrating stakeholder perspectives and values is key to the effective bounding of environmental problem systems, both in a conceptual and managerial sense. In Ulrich's words (p. 6), "When it comes to making boundary judgments, experts and policy-makers have no natural advantage of competence over lay people" (Ulrich 1998).

For Ulrich, public deliberation is the appropriate locus for bounding decisions, because their subjective and power-laden nature means that technical specialists (e.g. ecologists or environmental engineers, in the case of environmental problem-solving) have no special insight into the ethical and social concerns that should shape how boundaries are determined (Ulrich 2000). Hajer and Wagenaar, in their book Deliberative Policy Discourse, likewise stress that in an era where policy problems transcend pre-given decision-making boundaries, some form of public deliberation must underlie new iterations of "rules of the game" in order for them to have widespread legitimacy (Hajer and Wagenaar 2003).

While public deliberation and collaborative decision-making has been a defining feature of much scholarship and practice of environmental policy, and policy in general for at least the last two decades (Krimsky 1979; Fischer 1981; Barber 1984; Dahl 1994; Gunderson 1995; Wondolleck and Yaffee 2000), it is not typically the case that stakeholders are actively involved in delineating the boundaries that will define and structure that participation. And, while the trend towards collaborative watershed-based planning is predicated on the notion of participation by both those affected by water problems and those affected by potential policy solutions (Leach and Pelkey 2001; Leach, Pelkey et al. 2002; Moore and Koontz 2003; Lubell 2004; Sabatier, Weible et al. 2005), ecological ways of problem bounding do not necessarily match the way that stakeholders bound problems, which may have implications for whether or not such participation can be truly meaningful or effective.

Given the inherent subjectivity and the ethical and political significance of both conceptual and managerial problem bounding, the aim of this research is to explore these processes from the "bottom-up" as they occur in the perspectives and preferences of individual stakeholders. If we could learn more about the way different individuals – representing different groups, with different values and views of the world, coming from different places, located differently with respect to the problem geometry – engage in problem bounding, we might be able to design more meaningful and effective collaborative processes.

Ample previous research has identified the importance of values, interests, and group affiliation in shaping how stakeholders think about and may seek to influence the organizational structure and rules of environmental problem-solving institutions (Sabatier 1988; Blomquist and Ingram 2003; Weible 2005). Less attention has been given to empirical study of the role of the place or spatial positioning of an individual within a complex system. Nevertheless, there are several reasons to suspect that place might play a significant role in the way stakeholders relate to environmental problems, understand their essential dynamics, and may (or would, if given the opportunity) exert their efforts in influencing the structure of management institutions.

1.8 Place and Problem Bounding

Most environmental problems are explicitly spatial in character, involving a particular kind of "geometry" that individuals are in some positional relationship with. For example, water problems have a mostly linear geometry that can be characterized as upstream/downstream; landfills – and the noxious sights and odors they exhibit - are more like concentric circles that have a near/far geometry; climate change has a global geometry that is a function of the relative positioning of carbon sources and sinks. Where an individual or organization is spatially positioned within a problem's geometry undoubtedly will shape what they pay attention to and worry about, as well as the kinds of accountability they may or may not be willing to take on (Hannon 1987; Hannon 1994; Hannon 2004).

In recent work, for example, policy scientists and political economists have tackled the question of why water planning based on the boundaries of watersheds, despite the fact that it seems to make sense from an ecological perspective (Kauffman 2002), has not always gained political traction (Leach, Pelkey et al. 2002; Lubell 2004; Blomquist and Schlager 2005; Lach, Rayner et al. 2005; Sabatier, Weible et al. 2005). Particularly relevant is work that has explored the role of spatial positioning – here in terms of upstream and downstream relationships – and its perceived and actual impacts on the transaction costs and loss of local sovereignty associated with large scale collaborative planning endeavors (Dufournaud and Harrington 1990; Fischhendler and Feitelson 2003; Fischhendler and Feitelson 2005; Feitelson 2006; Garcia-Valiñas 2007). The basic insight of these authors is that while stakeholders located at points downstream may be quite motivated to adopt Managerial boundaries based on watershed demarcations (because they are impacted by the actions of upstream stakeholders), stakeholders living upstream may be far more hesitant (because all they have to gain is increased accountability).

In this sense of place as relative spatial position, place is most relevant for understanding how stakeholders engage in managerial bounding, because it is the managerial bounds that will define who is accountable to whom, as well as other rules that have direct bearing on distributional issues such as who pays and who gains[2]. But there is also another sense in which place is relevant for problem bounding, in this case conceptual bounding. There has been increasing attention given by environmental policy makers and scholars to the notion of developing environmental policies that are sensitive to and/or incorporate the subjective and particularized meanings, commitments, and perceptions of the humans that live in and interact with specific landscapes (Bolton 1992; Norton and Hannon 1997; Cantrill and Senecah 2001; Bott, Cantrill et al. 2003; Cheng, Kruger et al. 2003; Stedman 2003). For Norton and Hannon (1997) environmental policy that is built "bottom-up" from a series of particularized senses of place will enhance the attainment of democratic ideals. For Cantrill and Senecah (2001), people's attachment to and perspective from particular places is a powerful source of conservation-oriented behavior and advocacy.

Place in this second sense, the kind that conservationists and others working in a similar vein are trying to tap into, can not be measured in a objective or Euclidean manner (Norton, Zia et al. in process). It is rather sense of attachment to, identification with, or commitment to a particular part of the world. The boundaries of place, of course, are a function of individual subjectivities rather than objective realities (Tuan 1977; H.M., Fabian et al. 1983; Altman and Low 1992; Bolton 1992; Entrikin 1999; Eisenhauer, Krannich et al. 2000; Cantrill and Senecah 2001; Hidalgo and Hernandez 2001; Bott, Cantrill et al. 2003; Stedman 2003; Stedman 2003; Yung, Freimund et al. 2003). Nevertheless, this is not a reason to believe that they can't be studied. Empirical

[2] In a follow-up project to this dissertation, I plan to explore the relationship between problem bounding and the formulation of "trade-off" problems in environmental decision-making.

researchers have included place in studies of perception and behavior, and have done so by a variety of methods (Alkire and Deneulin 1998; Eisenhauer, Krannich et al. 2000; Hidalgo and Hernandez 2001; Vorkinn and Riese 2001; Stedman 2002; Cheng and Daniels 2003; Cheng, Kruger et al. 2003; Moore and Scott 2003; Stedman 2003; Stedman 2003; Williams and Vaske 2003; Yung, Freimund et al. 2003; Coulton, Cook et al. 2004; Hannon 2004). The challenge is to develop an operationalization of the concept that is both systematic enough to compare across cases in a rigorous way but open enough to account for individual subjectivities (Norton, Zia et al. in process). While the importance and difficulty of this task is acknowledged here, the methods for researching place in this dissertation will remain quite modest, with the confidence that improved methods will be forthcoming.

The empirical work of the dissertation is centered on a specific public process in which conceptual and managerial bounding by diverse stakeholders - both positioned in spatially different places, and with attachment to different kinds of places - was directly observable through participant observation and survey research. From 2005 to 2007, Georgia's Environmental Planning Division facilitated a state-sponsored, multi-year public advisory process, one outcome of which was the delineation of new boundaries for environmental decision-making in Georgia, specifically a set of 11 water planning regions. Research, discussed in Chapter 2 below, focused on the factors influencing the way individual stakeholders from different places, with different values, and representing different groups conceptualized the bounds of water problems and solutions. Furthermore, stakeholder preferences for how the spatial structure – the managerial bounds - should be delineated for ongoing planning and decision-making were explored.

CHAPTER 2

PLACE AND PROBLEM BOUNDING IN GA'S WATER PLANNING PROCESS

The empirical part of this dissertation, discussed in this chapter, is designed to explore the ways in which complex environmental problems come to be bounded, both conceptually and for managerial purposes. The focus is on conceptual and managerial bounding as engaged in by individual stakeholders who are part of the problem and/or its solution. As has been discussed previously, the way the boundaries of environmental problem solving get defined has important political, economic, ecological and even cultural implications. The intent of this research is that, by learning more about the way different individuals – representing different groups, with different values and views of the world, coming from different places, located differently with respect to the problem geometry – engage in problem bounding, we might be able to design more meaningful and effective institutions and collaborative processes.

The particular emphasis of this research is on how place, both in terms of identity /attachment /commitment and in terms of spatial location may shape problem bounding. I begin Chapter 2 with an explication of a specific complex environmental problem – water planning and management in Georgia. Next, I explain the methods of the research, which integrate participant observation with the design and implementation of a survey on "problem bounding." An extensive discussion of the dependent and independent variables, and a presentation of summary statistics and analysis of the results follow.

Finally, the results are summarized and discussed, and limitations of the data and research are presented.

2.1 Water and Water Planning in Georgia: A Complex Problem

Water issues in Georgia are complex. There are 14 major river basins in the state of Georgia, and the metropolitan region of Atlanta sits squarely on top of the upstream portions of five of them. Since river systems are inherently fractal and multi-scalar, these14 river basins can be divided into 52 sub-watersheds (and so on). There are 159 counties in GA, many of which sit on top of two or more river basins or sub-watersheds. Because the activities located at a given site within the land area that comprises a river basin/watershed – both activities that use water and activities that may affect its quality – have impacts at all points located downstream of that site, there is an inextricable and asymmetrical linkage between upstream and downstream counties. Thus, activities in counties upstream affect counties downstream in the same basin or watershed, but not, at least from the standpoint of the dynamics of the natural systems, vice versa. There exists also in parts of Georgia a linkage between surface and groundwater. Below the fall line, and in particular in the southeastern coastal portion of the state, groundwater provides a significant proportion of drinking water as well as water used for other purposes.

The following two maps, Figure 2[3] and Figure 3[4], show ways of spatially partitioning the state of Georgia in terms of 14 river basins or 52 watersheds.

[3] http://www.georgiaadoptastream.org/Home/map/EPD_141.JPG, accessed August 2008
[4]http://www.georgiaplanning.com/watertoolkit/Documents/WatershedPlanningTools/MapofGeorgias52LargeWatersheds.pdf, accessed August 2008

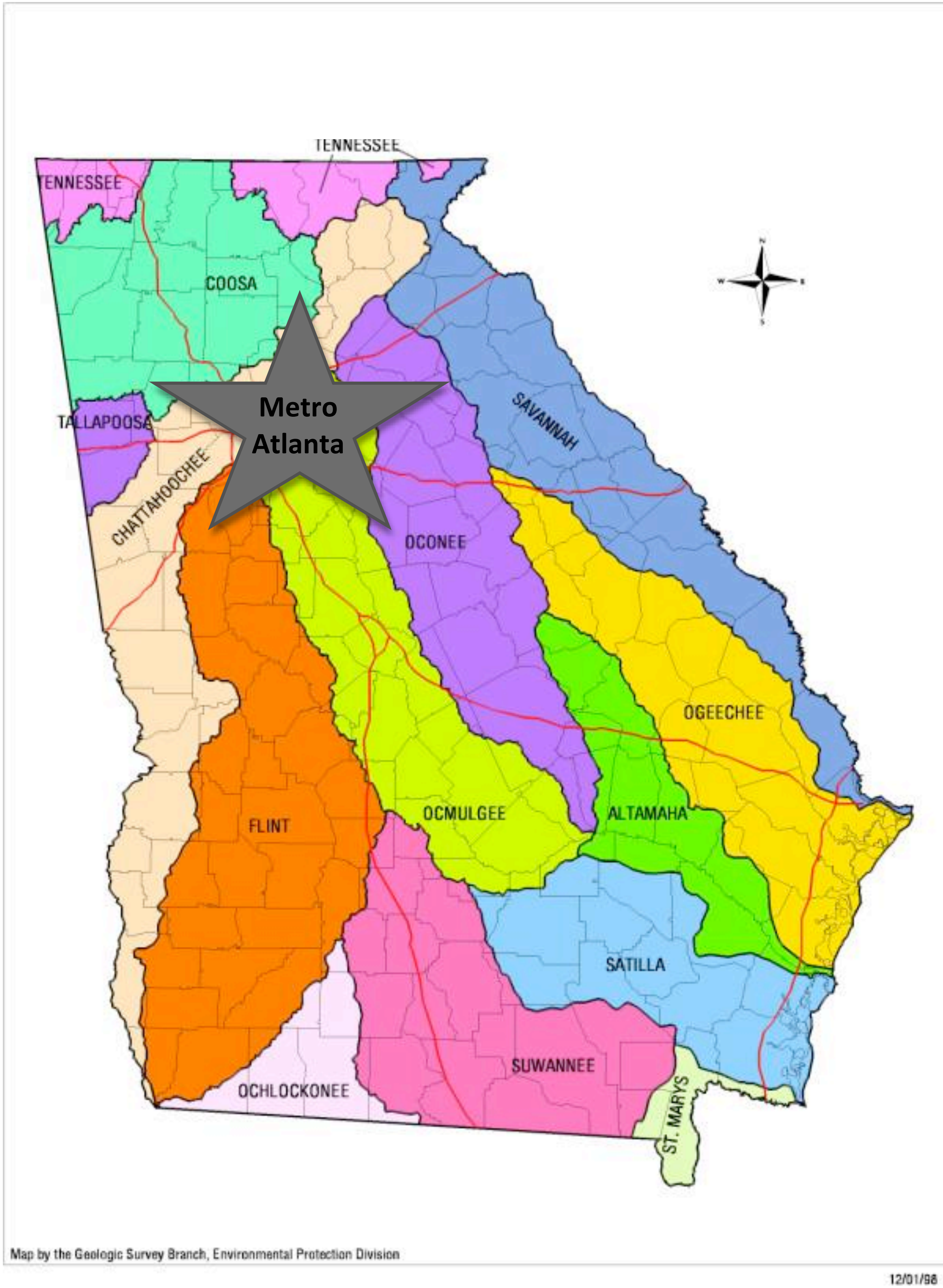


Figure 2. Georgia's 14 Major River Basins

Figure 3. Georgia's 52 Watersheds

The question of how best to partition Georgia into sub-state regions to assess water issues is not (only) an academic one. On May 13, 2004, Georgia Governor Sonny Perdue signed into law House Bill 237, the "Comprehensive State-wide Water Management Planning Act[5]. The primary thrust of the Bill was to assign the Georgia Environmental Protection Division (EPD) of the Department of Natural Resources, with the input and support of a Water Council (composed of Legislative and State Agency appointees), the task of developing a state-wide water management plan that will provide guidance and incentives for regional and local water planning efforts. The Act charges that the water plan will "involve meaningful participation, coordination, and cooperation among interested and affected stakeholders and citizens as well as all levels of governmental and other entities managing or utilizing water." Among other things, one of the main goals of the planning process was to develop a system of dividing the state into "sub-state" regions for ongoing water planning and management. In essence – to "managerially bound" Georgia's water problems.

The county-crossing, upstream/downstream, and fractal nature of river systems represents one dimension of the complexity inherent in water problems and attempts to manage them. The other dimension of complexity is represented by the multitude and variety of uses of and impacts on water resources in the state, including agriculture, mining, power generation, use by business and industry, aquatic recreation, and the provision of water and sewer services for a rapidly growing population. From the perspective of someone whose lifestyle or livelihood is based on one of Georgia water's more economically productive uses, it is important to point out, it is not necessarily the case that watersheds

[5] http://www.legis.state.ga.us/legis/2003_04/fulltext/hb237.htm, accessed August 2008

– at whatever scale – are the most meaningful or preferable ways of spatially structuring water planning and management.

The possible tension between alternative ways of bounding, both conceptually and managerially, Georgia's water problems is captured in a statement made by Senator Russ Tolleson, who at the time he made this statement was the chair of the Natural Resources sub-committee of the Georgia Legislature. The statement (paraphrased) was made during one of the advisory committee meetings I attended (Flint BAC, 9/19/06) in the participant observation portion of the research described below.

> I look at the entire state as one economic engine. I don't look at the different regions as separate entities. Every different part of the state is a different cylinder in that engine. Metro Region – transportation; Southern - huge agricultural region; Coast - port systems; West GA - military complex, financial services; Center of State - Agriculture, Forestry, Military, fast growing. There's a lot of different cylinders in our engine and we need to be hitting on all cylinders. We need to do water policy that allows us to do that. We do have a limited resource in terms of water. We need to keep in mind that the entire state has something to offer. Water is a resource that everybody has to have to survive and to grow. We need to look at that as we look at our river basins and try not to think too narrowly. [Here in this region] we need to protect our basin and also remember that we are one of the economic cylinders in the state.

Senator Tolleson, in his comments, implicitly refers to two distinct ways of thinking about – and possible managing – Georgia's water resources. On the one hand, he states that water is a limited resource, and acknowledges the need to pay attention to and protect river basins. On the other hand, he develops a metaphor of an "economic engine" with multiple cylinders. In spatial terms, these cylinders are not congruent with watersheds conceived at any scale. Rather, they are most closely associated with a way of dividing the state according to its similarities in terms of cultural or economic resources. While he did not explicitly mention them, this form of spatial bounding is perhaps best exemplified by the map shown in Figure 4 below of Georgia's 16 "Regional Development Centers" which emerged as part of the 1989 State Planning Act, the purpose of which was "to promote greater coordination of growth strategies and community and economic development[6]." Unlike watersheds and river basins, RDCs, as they are called, follow the contours of Georgia's 159 counties.

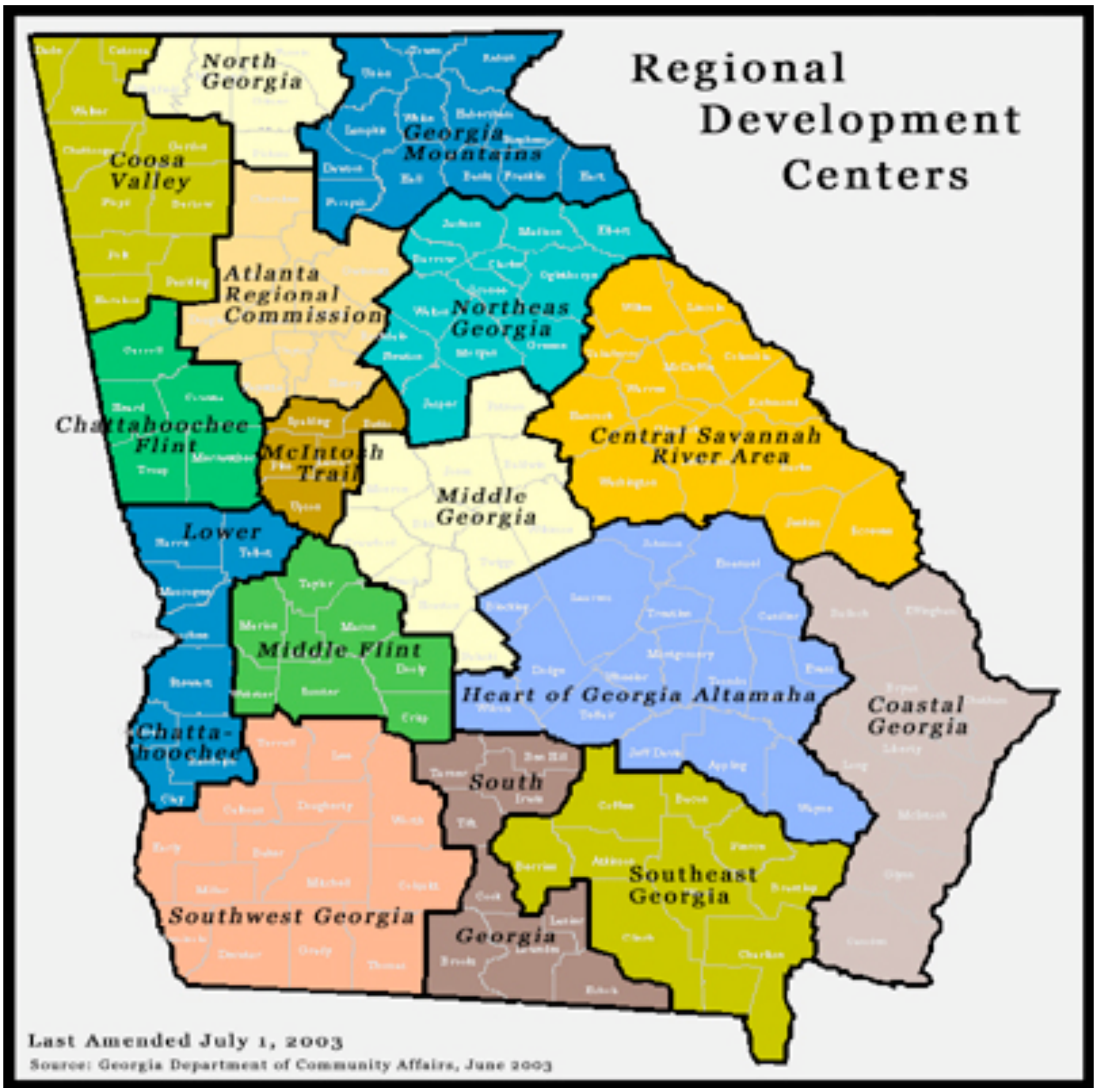


Figure 4. Georgia's 16 Regional Development Centers

[6] http://www.gadata.org/information_services/reg1.htm#Altamaha, accessed August 2008

It is important to note that at the time the planning process began, there was one sub-state regional water planning entity empowered by the state to guide planning efforts: the Metropolitan North Water Planning District, which consists of 16 counties in the metropolitan region shown on the map Figure 5, below, and is closely (but not perfectly) aligned with the Atlanta Regional Commission RDC shown above.

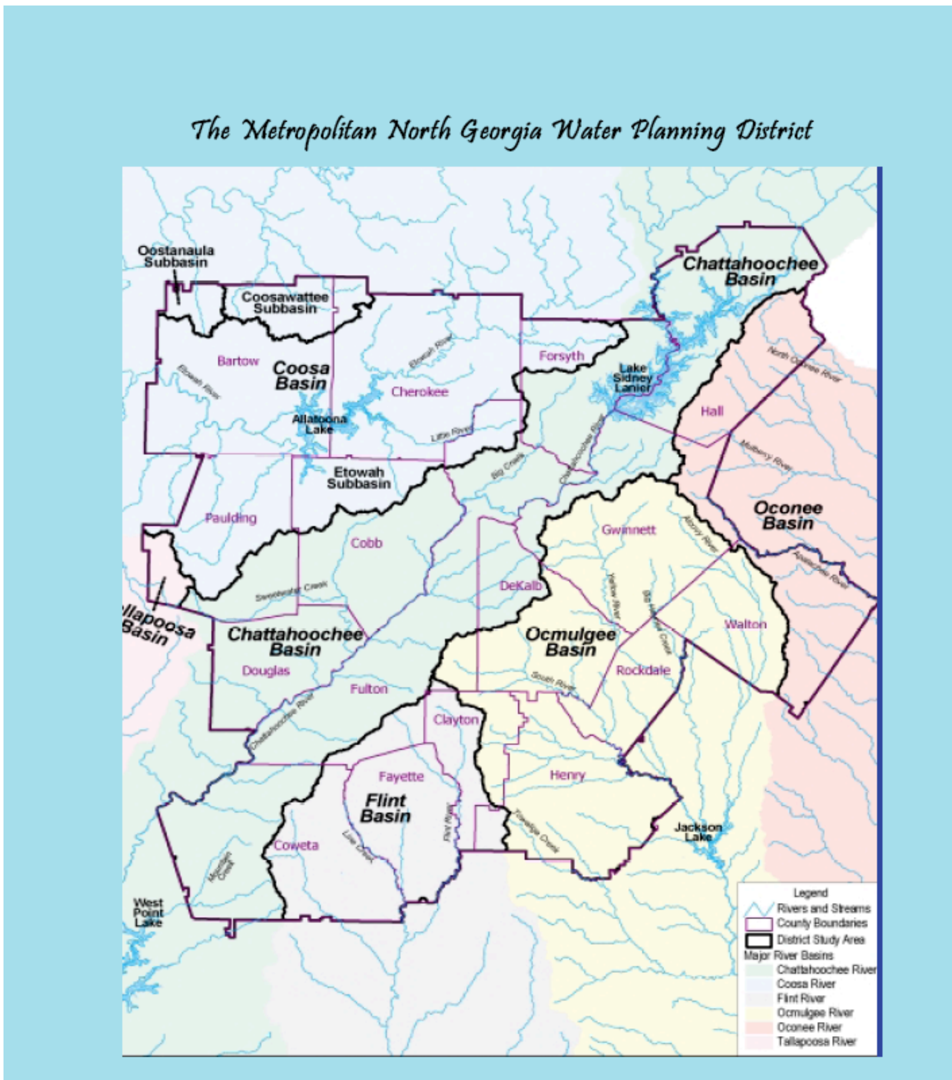


Figure 5. The Metropolitan North GA Water Planning District

The participatory process of developing Georgia's water plan, overseen by EPD head Dr. Carol Couch and staff, involved eliciting and compiling input from three advisory groups, the Water Council, and the general public. The three advisory groups included: the Technical Advisory Committees (TACs), selected for their technical expertise in water management and water issues; the State-wide Advisory Committee (SAC), composed of representatives of organizations that have statewide constituencies and interest, and 7 Basin Advisory Committees (BACs), which were composed of individuals selected both to represent a diversity of organizational interests and geographic diversity as determined by river basin and aquifer boundaries. Organizational interests represented by BAC members included: agriculture, conservation, business and industry, recreation groups, county and municipal government, regional development centers, water utilities, and existing regional water organizations. The particular way of structuring geographic diversity in the BACs is shown in Figure 6[7]. Georgia's 14 river basins were grouped into 6 aggregations based on river basin lines, with the 7th BAC being determined by the contours of the Metro North Georgia Water Planning District.

[7] http://www.georgiawaterplanning.org/Images/BAC_map.jpg, accessed August 2008

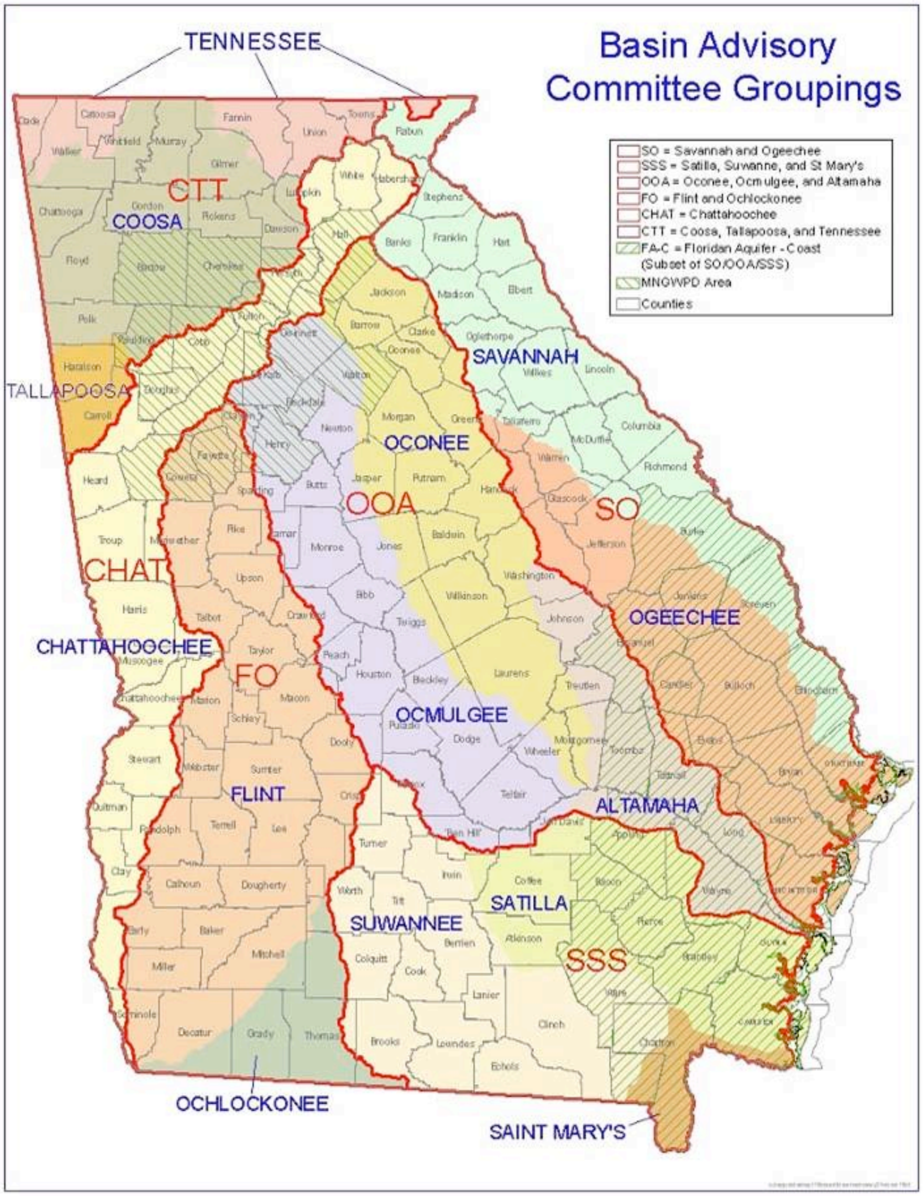


Figure 6. Spatial structuring of the BACs

The role of the BACs was to provide "structured regional perspectives and input on water management objectives and potential policy tools and/or options"[8]. BACs met six times each between September of 2005 and July of 2007, and their feedback was given a high priority in the development of the water plan. The participatory component of the water planning process officially ended in July 2007, when the EPD submitted a draft plan to the Water Council.

2.2 Research Methods

Meetings of the Basin Advisory Committees (BACs) were open to the public, and thus were an ideal place to learn about how a group of people from diverse groups and places, who care enough about water problems to volunteer their time (or be paid by their organization) to advise the development of Georgia's water plan, approach Georgia's water problems. Furthermore, individual BAC members, because of their diversity both in terms of organizational affiliation and in terms of place, represented the ideal population for research on the influence of these factors on problem bounding as it relates to water planning in Georgia.

Research proceeded in two phases. Between September of 2006 and April of 2007, I engaged in participant observation by attending at least two and preferably three BAC meetings for each of the six rounds, and also attended several meetings of the State Advisory Committee. For meetings that weren't attended, I obtained publicly available "facilitator notes" of the meetings, which typically included direct quotes, paraphrases, and a summary of the observations and thoughts of meeting facilitators. Data from

[8] http://www.gadnr.org/gswp/Documents/bac.html, accessed August 2008

participant observation was used to develop a survey, which was administered between April 5th and April 25th of 2007 to the 191 members of the Basin Advisory Committees. The two methods are explained in detail below.

2.2.1 Participant Observation

The purpose of participant observation was to develop a basic understanding of water issues and solutions as viewed through the eyes of stakeholders, and also to develop specific items for use in a survey on problem bounding. At each BAC or SAC meeting attended, I took extensive notes on a laptop computer of meeting proceedings. In particular, I listen for and transcribed as closely as possible statements pertaining to the conceptual bounding framework that will be explained in more detail below. In addition, I engaged in informal conversations about water planning and policy with meeting participants and meeting organizers. I informed anyone I spoke with that I was a graduate student at Georgia Tech studying the water planning process. I did not take notes during conversations, but wrote down items of significance as soon as possible. Neither in my note taking during meetings or after informal conversations did I link statements with the names or identifiable characteristics of individuals. This was in part due to privacy concerns, but also because understanding problem bounding at the individual level was not the intent of the participant observation – that was the goal of the subsequent survey.

Of the several theoretical frameworks presented in Chapter 1, the most useful for engaging in participant observation was discourse theory. Specifically, my methodological influences included:

- Scholars who have applied discourse theory to the study of environmental policy, in particular Hajer (Hajer 1995; Hajer and Wagenaar 2003; Hajer and Versteeg 2005)in (Acid Rain) and Dryzek (Dryzek 1997).
- Critical discourse theory, and in particular "boundary critique", as discussed by Ulrich (Ulrich 1998; Ulrich 2000; Ulrich 2003).
- Bryan Norton's discussion of pragmatism and language, in the Appendix of: <u>Sustainability, Towards a Philosophy of Adaptive Management</u> (Norton 2005).

Although Norton does not offer a specific empirical methodology, like the other authors mentioned he points out that all problem descriptions are, first and foremost, language. Furthermore, the way we use language is a function of who one is talking to, what we are trying to say (or not say), and, often (or always, according to discourse theorists who generally cite Focault as their inspiration in this claim (Sharp and Richardson 2001)) a function of what has already been said.

The difference between what I did and the methods proposed by discourse theorists is that I did not attempt to develop "narratives" or "stories" or "ensembles" that comprise the discursive system through participant observation and/or interviews alone. Rather, I focused only on the specific elements of those stories that were articulated, elements belonging to categories that were pre-identified through the development of a specific framework for learning about conceptual bounding processes. The way these elements fit together was explored through subsequent statistical analysis based on survey research.

2.2.2 Survey

As the participant observation phase of the research drew to a close, the next step was to use data gathered during participant observation to develop a survey, 1) to explore how the individual conceptual bounding elements that stakeholders were observed to state during participant observation clustered together, and, 2) to explore the influence of place and other factors in shaping the way individuals engage in conceptual and managerial problem bounding. The complete survey (mail version) can be found in Appendix A.

The Survey included basic questions about the BAC the respondent was a part of, the number of meetings they attended, their organizational affiliations, where they live, work, and recreate, and whether they identify as living in a rural, urban, or suburban part of the state. It also included specific questions, developed from participant observation, to get at problem bounding both conceptually and managerially, including identification of threats to water resources, prioritization of goals of water planning, strategies for achieving those goals, agreement or disagreement with a series of statements and opinions designed to get at underlying metaphors, and selection of a preferred spatial framework (watersheds, RDCs, etc.) for structuring ongoing water planning and management in the state. Additionally, questions drawn from previous survey research (Weible, personal communication) were used to get at basic respondent values about politics, the environment, and economics. Finally, although not used for this particular analysis, questions concerning stakeholder satisfaction with and impacts on the process were also included in the survey.

The survey was administered between April 5th and April 25th of 2007 to the 191 members of the Basin Advisory Committees, via a combination of the Internet – using survey-monkey - and mail (for those participants without email addresses, or for whom the email address available did not work). The mail survey was identical to the Internet survey. The names, emails, and addresses of all Basin Advisory members were available to the public through the Environmental Protection Division. Survey questions were designed to elicit the relevant information without asking respondents to include any information that could personally identify them. All data and raw results are kept confidential.

Of the 191 surveys administered, 78 surveys were completed, for a response rate of 41%. Table 2, below, compares the sample of survey respondents to the overall population of individuals who participated in the BAC meetings using the only three variables that were available for the population: BAC membership, Place (urban/rural) and Affiliation. The information on the 193 BAC members was publicly available from the Environmental Planning Division. It is worth noting that although there were 193 BAC members; only 191 were included in the relevant population for survey distribution because there were 2 individuals for whom there was no mailing address or email address information. By comparison, we can see that the sample includes a larger proportion of 1) Savannah & Ogeechee and 2) Chattahoochee BAC members than the population, and a smaller proportion of 1) Satilla, Suwanee & St. Mary's, 2) Oconee, Ocmulgee & Altamaha and 3) Metro Overlay BAC members. In terms of a geographic comparison, there is a smaller proportion of urban respondents in the sample than in the population, and a larger proportion of rural individuals in the sample compared to the population.

Table 2. Comparison of Study Sample to BAC Membership Population

	Sample #	Sample %	Population #	Population %
BAC membership				
Savannah & Ogeechee BAC	18	23%	27	14%
Satilla, Suwanee, St. Mary's BAC	6	7%	21	11%
Oconee, Ocmulgee & Altamaha BAC	10	13%	31	16%
Flint & Ochlocknee BAC	10	13%	24	12%
Chattahoochee BAC	14	18%	27	14%
Coosa, Tallapoosa & Tennessee BAC	10	13%	22	12%
Metro Overlay BAC	10	13%	31	16%
Missing	0	0%	10	5%
Urban	47	60%	132	68%
Rural	30	39%	51	26%
Missing	1	1%	10	6%
Affiliation				
Agriculture	10	13%	11	6%
Business	17	22%	58	30%
Environmental	12	15%	28	15%
Water	10	13%	17	9%
Government	22	28%	43	22%
Other	7	9%	12	6%
Missing	0	0%	24	12%
Total N	78		193	

The sample is consistent with the population in that the majority of the respondents are from urban areas. Finally, in terms of organizational affiliation, there are a larger proportion of people in agriculture, water and government organizations in the sample than in the population. However, the relative distribution of individuals across the affiliation categories is similar in the sample and the population. Overall, this suggests that the sample is fairly representative of the population.

2.3 Research Questions

In this section, the research questions are formulated in terms specifically geared to the Georgia state water planning process. This empirical analysis will contribute to a broader understanding of how stakeholders bound complex environmental problems both managerially and conceptually.

<u>Question 1</u>: How is conceptual problem bounding influenced by a Basin Advisory Committee member's place in terms of:

a) Whether they self-identify as living in a rural, urban, or suburban part of the state

b) The relative location of their home county on an upstream / downstream continuum within the relevant watersheds

c) Their organizational affiliations

d) Their basic political, environmental, and economic values

<u>Question 2</u>: How is managerial problem bounding influenced by a Basin Advisory Committee member's place in terms of:

a) **Whether they self-identify as living in a rural, urban, or suburban part of the state**
b) **The relative location of their home county on an upstream / downstream continuum within the relevant watersheds**
c) **Their organizational affiliations**
d) **Their basic political, environmental, and economic values**

2.4 Operationalizing Variables

In this section, I will describe the way the variables are defined, and go into some detail about how I created the variables using the core survey questions.

2.4.1 Dependent Variables

<u>Conceptual Bounding</u>

I developed two conceptual bounding variables that are standardized continuous variables that reflect two "idealized" representations of conceptual boundaries that emerged from the collective responses of the survey respondents and were extracted using cluster analysis. This section enumerates the details of the process through which I created the two conceptual bounding variables.

To develop the variables relating to conceptual bounding, notes from my participant observation were used to develop a set of problem elements according to a predetermined framework, which was developed by applying the elements of discourse discussed by Dryzek in his book: Politics of the Earth to the case at hand. For Dryzek, a discourse consists of four inter-related elements: 1) the basic entities whose existence is recognized or constructed, 2) assumptions about natural relationships, 3) assumptions about agents and their motives, and 4) key metaphors and other rhetorical devices (Dryzek 1997). For the purposes of this research, I refined Dryzek's schema to reflect a focus on water problems and planning. The elements I focused on included: 1) perceived drivers of water related problems, 2) goals for water planning, 3) preferred strategies for achieving those goals, and 4) underlying metaphors pertaining to water and water planning. Thus, a complete formulation of "the problem" would be underpinned by a central metaphor about water and water planning, and include information about what the threat is, what we are trying to achieve through a planning process, and how to do that. The basic framework that guided the participant observation is diagrammed in Table 3 (which is the basic skeleton of Table 1 used in Chapter 1 to demonstrate Leopold's evolving view of the wolves-deer-mountain problem system).

Table 3. Conceptual Bounding Framework

Problem Drivers	**Goals**
Strategies	**Underlying Metaphors**

This framework was then used as a listening tool during participant observation, the intent of which was to construct a "total" set of conceptual bounding elements - drivers, planning goals, strategies, and underlying metaphors pertaining to water and water planning in Georgia. This set is of course not all of the possible ways of conceptually bounding water problems in Georgia, because, among other more metaphysical reasons, clearly the specific framework chosen (drivers, goals, strategies, metaphors) functions to "bound" the possibilities. Nor is this intended as an accurate representation of something as detailed as "mental models," which include information not only about which elements are in and which are out but also about causal influences between elements (Bostrom, Morgan et al. 1994).

In the following tables, Table 4 through Table 7, illustrative statements from advisory committee members are included from the participant observation. The statements are either direct quotes (or paraphrases that are as close as possible given the limitations of my note-taking), or quotes taken from reports given by meeting facilitators and posted to the Georgia Water Planning website constructed by the Environmental Planning Division. They are representative statements, made at advisory committee meetings, which speak directly to conceptual problem bounding in terms of drivers, goals, strategies, and metaphors. In bold, above the quotes, are the over-arching categories that emerged from subsequent coding and categorization. The bold statements correspond with the squares in Table 3, above.

Table 4. **Drivers of water problems in Georgia, as stated by advisory committee participants.** *Committee designation and date of meeting in parentheses. *From facilitator notes.*

Excessive Government Regulation

*The pulp wood industry is the engine that drives green space and other economic factors in this basin. If you come down too restrictively on the pulp wood industry, you will see more trailer parks and pine plantations. The loss of the pulp wood industry would mean conversion of land use to trailer parks, an increase in the demand for costly services for those filling the trailers, loss of foreign trade, and a downturn in local taxes. Is that what you really want? (Satilla 1/23/06)

Droughts/Climatic Events -Drought was a ubiquitous part of all advisory discussions (pdh)

Agriculture – Use/Pollution

*The Chattahoochee River is low. The agricultural interests are pumping large volumes of water for irrigation. The Flint River seems to be dry for the same reasons (Chat 3/14/06).

Business/Industry – Use/Pollution

A lot of work [has been done] in the last 30 years cleaning up industry point sources (Flint 9/19/06)

Other States – Use/Pollution

*People are being asked to conserve water at their homes, when industry is allowed to squander millions of gallons or to use more of it so that electricity can be sent to Florida (Satilla 1/23/06)

Septic Systems – Use/Pollution

I'm concerned about septic tanks – short-term and long-term. We have a lot of septic tanks in GA and I don't think we're dealing with that issue (Oconee 9/25/06).

Wastewater Treatment – Waste/Pollution

We're losing millions of gallons per day through leaks (State 3/24/06).

I see countless pollution. It's not from sewer pipes (Oconee 9/25/06).

Urban Areas – Use/Pollution

I understand non-point source in terms of agriculture, but what about the all the cars in Atlanta, and their impact on water. When are we doing to look into and deal with that? (Coosa 9/21/2006).

Wildlife – Use/Pollution

We've got to learn how to make the distinction between what is influenced by nature – naturally occurring – and what is influenced by man. I can take you places where the loads are exceeded but there's no human influence: it's beavers. But when you take the sample there's no difference between that and something that is influenced by agriculture, or road runoff (Coosa 9/21/2006).

Get rid of the deer – they're the highest contributor of fecal coliform (Oconee 9/25/06).

Table 5. **Goals for water planning and policy intervention in Georgia.** *Committee designation and date of meeting included in parentheses. *From facilitator notes.*

Ensure Clean Drinking Water

*Let's increase water standards [and make] water safe for population (Oconee 9/25/06)

Foster Economic Growth

As the future of the state goes so goes our business. If a business is getting ready to spend millions on investment in the state and they have a perception that in 10 years their water is going to be cut off, they're going to be looking elsewhere. There is already a perception that water resources will not be available in the future. We want to make sure that perception doesn't become reality (Chat 1/31/06).

Protect the Environment

I think the downstream users, and the fish (who I feel I represent) need enough water for basic support of aquatic ecosystems (Chat 1/31/06).

Minimize Conflict Between Water Users

If we'll go to war over oil, imagine water (Oconee 9/25/06).

*Shortages of water will possibly result in conflicting/ competing interests (Flint 2/2/06)

Protect and Enhance Recreational Opportunities

I was born and raised on the Chattahoochee banks in Fort Gaines. I have fond memories of what I want the basin to look like for my children for the future. Our county is heavily dependent on recreational tourism/ecotourism. We need to maintain that to our best ability (Chat 1/31/06).

Maximize Food Production

I'm from a small town. I'm also a poultry farmer. About a third of our customers on water system are poultry farmers. I'm very interested in keeping our water flowing for the poultry farmers (Chat BAC, 1/31/05).

*Water used for food production should be prioritized (Flint 2/2/06)

Farmers should have timely access to water for agricultural purposes (State 4/24/06).

Protect GA's Water Resources from Other States

*How can you have state procedures for waters shared by other States? (Savannah 9/28/06)

Table 6. **Strategies for achieving water planning and policy goals in Georgia.** *Committee designation and date of meeting included in parentheses. *From facilitator notes.*

Invest in Technological Solutions

The other thing that's not mentioned is desal, which has the potential to move large amounts of water inland from the coast. I'm wondering how these things will be included in the plan (State 4/24/06).

*Technology keeps improving also and better ways to handle things are constantly coming on to handle things (Satilla 1/23/06)

Promote Voluntary Conservation and Pollution Prevention

*Industry would prefer to be given a set of water conservation goals and select for themselves the best methods to meet reduction goals (Chat 3/14/06)

*By making certain user groups undertake onerous measures, you may hamper your efforts to gather Information, and may inadvertently induce excessive use of water in some cases. People may switch from one wasteful practice to another (Satilla 1/23/06)

*This would definitely have to be on an incentive driven basis and not mandatory. Few farmers would accept being told how to manage their farms and which crops to grow (Flint 2/2/06)

Strengthen Regulations and Enforcement

As a decision maker, I like an inflexible rule, a mandate from the state, so I can go to my citizens and justify my decision. If I have to make my own judgment then I have a hard time justifying it to on the one-hand developers and on the other hand to conservationists or whatever (Metro 2/7/06)

*The construction site regulations should be extended to hog farms and other sources (Coosa 9/21/06)

Establish and/or Enforce Property Rights

*From a riparian rights perspective, I am not sure how we allocate future resources to someone who does not have an existing right. People who have water rights have an existing right. Water goes with the land. Without an existing basis for that right, how do you look forward 20 years and tell someone then that they do not have the right. Not sure how to do that (Chat 9/26/06)

Develop Market-Based Approaches

*I like trading because you are looking for innovative solutions (Chat 9/26/06)

*Pollution trading would be a really poor tool for GA. You end up with pollution hot spots. We would need intensive monitoring at a huge and prohibitive cost. This would negate the benefits of the trading program itself (Chat 9/26/06)

Table 7. **Statements pertaining to underlying metaphors about water and water planning.**
*Committee designation and date of meeting included in parentheses. *From facilitator notes.*

Watershed 1: In-stream flows should mimic natural flows.

We want there to be minimum in-stream flows to protect conservation of ecosystems (Chat 1/31/05)

I've heard a phrase that you should try to mimic natural flows, and that could be an alternative way to look at resource systems (State 3/26/06)

Watershed 2: Water resources are finite. There is only so much to go around.

By the year 2016 they're expecting that a new pop amounting to present day city of Denver will be in Atlanta. That's another two million people. We're in a very small dangerous basin (Chat 1/31/05)

*[There is] finite fresh water for use. If we believe that, there is finite wasteload allocation available (Chat 9/26/06)

We just don't know how big the pie is. How much water is out there? (Metro 2/7/06).

Watershed 3: We should determine how much water is available in each region and limit population through planning and zoning to match.

The average person doesn't want growth (Coosa, 9/21/2006)

There continues to be an undercurrent to all of this related to growth in the Metro area. There are some who oppose water conservation because it will, in theory, allow more growth. There are others who feel that existing residents should not be penalized (by paying higher rates or having their water use limited) so that growth for which we have inadequate transportation and education infrastructure can occur. It seems that it might make sense to determine how much per capita water use is appropriate, and limit population through planning and zoning to match (Metro 2/6/06)

Economic Engine: It is acceptable to move water from one basin to another if that will favor job creation and economic development.

I never understood what was so sacrosanct about river basins, and not crossing that border. It's a statewide resource. The water might not be where the people are. You might have to move the water where the people are (State 3/24/06)

This system [of conservation and re-use that the EPD is proposing] seems focused on what water resources are immediately adjacent to a community, and not what the resources are holistically in the state, and thus including a plan for moving resources from where they are to where to where they are needed (State 3/24/06)

Watershed 4: If you take water from a basin you should return it

This was a fairly common (and contested) sentiment, the reciprocal of the above way of way of thinking (pdh)

After participant observation, statements pertaining to the different elements of conceptual bounding were coded, and used to develop survey items, which allowed for an exploration of how individual BAC members engaged in problem bounding. Survey results were analyzed using hierarchical cluster analysis to look for which conceptual bounding elements occurred together. While factor analysis highlights an underlying variable, cluster analysis is used to classify elements into two or more groups (Everitt, Landau et al. 2001). In Appendix E, the results of SPSS hierarchical cluster analysis, as well as additional discussion about the construction of the relevant variables, is shown.

Cluster analysis was extracted using anywhere from two to four clusters. I spent a lot of time looking at the various groupings extracted by cluster analysis, comparing them against my empirical and practical experience. I decided that the 2 clusters option was closest to getting at the major divisions in the way stakeholders were looking at and describing water problems in Georgia. My next step was to look at the correlations between the elements classified into cluster 1 and cluster 2. Generally, there were multiple correlations between the elements, but a few items: threats = wildlife pollution and goal=recreational opportunities (not surprisingly, some of the same items that were classified into cluster 3 in the table shown in Appendix E) had very few correlations with other elements. I therefore removed these elements from the cluster. Appendix F shows the correlations between cluster elements.

The result of the cluster analysis was two clusters that I represent as “Conceptual Bounding Clusters 1 and 2 or CB1 and CB2. Tables 8 and 9, below, shows visually the two “conceptual bounding clusters” (analogous to cultural models or discourses) revealed by the cluster analysis process described above. I use these clusters in this study as the dependent variables in the analysis of the impacts of place on conceptual problem bounding.

Table 8. Conceptual Bounding Cluster 1

Problem Drivers	**Goals**
Excessive Government Regulation Pollution by Other States	Economic Growth Food Production Minimizing Conflict
Strategies	**Underlying Metaphors**
Technological Solutions Property Rights Market-based Approaches	*Water as Economic Engine* OK to Move Water to Meet Economic Development Needs

Table 9. Conceptual Bounding Cluster 2

Problem Drivers	**Goals**
Business / Industry Agriculture Wastewater Treatment Septic Systems Water Use by Other States	Protect the Environment Protect GA's Resources from Others
Strategies	**Underlying Metaphors**
Voluntary Action Regulations and Enforcement	*Water as Part of Nature (Watershed):* Instream Flows Should = Natural Flows Return Water to Basin of Origin Water Resources are Finite Use Planning to Guide People to Water

These clusters are consistent with the impressions I gained during participant observation, which can also be drawn on to flesh out these clusters with some narrative structure. For an idealized stakeholder who engages in conceptual bounding a la CB1, their primary concern is that the process does not result in an economy-stifling system of regulations and enforcement. If they are asked to point the finger for the water problems Georgia is experiencing, they blame pollution from other states (in addition to drought, which was a concern for all stakeholders). The goals they are concerned about upholding through their participation in the process include economic growth, the avoidance of conflict, and maximizing food production. The strategies they see as preferable for dealing with water issues are technological innovation (such as R and D on desalination), market solutions (like trade-able pollution rights), and the protection of property rights. They do not see water as a finite resource, probably because they are optimistic about the possibilities of technological innovation in "increasing the size of the pie." Additionally, they are willing to use engineering to move water from one basin to another if that will promote economic development and job creation. In general, water is more seen as a commodity than as something that is an inherent part of natural or cultural systems.

For a stakeholder who engages in conceptual bounding a la CB2, as he or she sits in the water planning process, they are concerned with a range of threats: septic systems, water treatment systems, agricultural runoff and excessive use, pollution and use by industry, and use of water by other states. They are intent on the goals of protecting Georgia's water resources from other states, and protecting the environment. Their preferred means of achieving these goals include voluntary methods and regulation. They view water as a finite resource, and they are not comfortable with moving water between basins, even if it's good for the economy. In fact, they would prefer to use zoning to restrict population growth in areas where there is a scarcity of water. Thus, a person who conceptually bounds the problem in this way sees water as a part of natural systems, and as solving the problems as something that necessitates behavioral change of some sort, either on the part of individuals or organizations.

These are idealizations, to be sure, and any actual stakeholder engages in a mixture of these two ways of bounding the system. Nevertheless, as idealizations they provide a basis for comparison against which groups of stakeholders, aggregated according to the place they are from, the groups they are affiliated with, or the values they share can be compared to study differences in the way these characteristics affect conceptual bounding.

Further details on the construction of the conceptual bounding variables are included in Appendix I.

Managerial Bounding

The determination of regional boundaries for water planning and management in Georgia was an explicit part of the planning process[9]. The variables relating to managerial bounding were operationalized as follows: Survey respondents were asked to choose regional planning boundaries from a list developed during participant observation, that included the following choices: watersheds/river basins, counties/municipalities, regional

[9] The discussion of regional boundaries, while referred to in several meetings, was the explicit agenda of the sixth round of BAC planning meetings. The survey was administered between the fifth and sixth round of meetings. The reasoning behind this choice was that participants would have been exposed to this question and be thinking about it, but would not have been unduly influenced by the active deliberations pertaining to it.

development centers, the state of Georgia, and soil/water conservation districts. Importantly, they were asked to make their selection under two distinct conditions:

- First, they were asked to assume that "regions defined by boundaries will be for PLANNING purposes only, and will have NO AUTHORITY to make or implement decisions."
- Second, they were asked to assume that "regions defined by boundaries will be given the AUTHORITY TO MAKE AND IMPLEMENT DECISIONS."

Furthermore, if the respondent chose watersheds/river basins in either of the above cases, they were asked to identify the appropriate scale for engaging in planning and decision-making. The question was open-ended, but respondents were given the following prompt: "Watersheds can be defined at many scales. What scale or scales should be used to define planning and management boundaries? From smaller to larger, possible watershed scales include: the scale of Georgia's 52 sub-watersheds, the scale of Georgia's 14 major river basins, and the interstate scale of the ACT, ACF and Savannah River Basin."

To create the variables used in the subsequent analysis, raw data from the survey was transformed in two ways. First, a binary variable was created that coded for whether a respondent chose a watershed or non-watershed type of boundary for sub-state regions for a) planning without decision-making authority and b) planning with decision-making authority. Second, an ordinal variable for the size of the planning scale was created by combining the information about scale of watershed with the choice of boundaries, again for both sub-state regions with and without decision-making authority. Tables B39 to 43 in Appendix B show data for the original survey responses and recoded binary and ordinal variables.

2.4.2 Independent Variables

Place

For the purposes of this analysis, place was operationalized as follows: First, to get at place as a form of attachment/commitment/identity, stakeholders were asked whether the place they lived was rural, urban, suburban, or mixed. Second, to get at spatial positioning, stakeholders were asked to identify the city they lived in or closest to. These were then assigned to counties. A series of maps, using the concept-mapping program c-map[10], were constructed to delineate whether a county was upstream, midstream, or downstream within its sub-watershed and larger river basin. This category was assigned with the help of a colleague. Both of us studied the map of upstream downstream relationships for the county in question (a separate map was created for each county a survey respondent was from), and determined whether the county of a respondent's residence was located at or near the headwaters (or the northernmost part of the watershed within Georgia boundaries) of a particular river basin. By way of example, Figure 7 below is a representation of upstream-downstream structure for Fulton County: Fulton County is upstream with respect to the Flint, Coosa, and Ocmulgee river basins, and it is located downstream of the Upper Chattahoochee sub-watershed and upstream from the Middle Chattahoochee sub-watershed. Because the Upper Chattahoochee is a

[10] The EPA website "surf your watershed" was extremely helpful in the construction of these Cmaps: http://www.epa.gov/surf/watershed.html, accessed August 2008.

large sub-watershed with a great deal of activity, Fulton was coded as a "mid-stream " county.

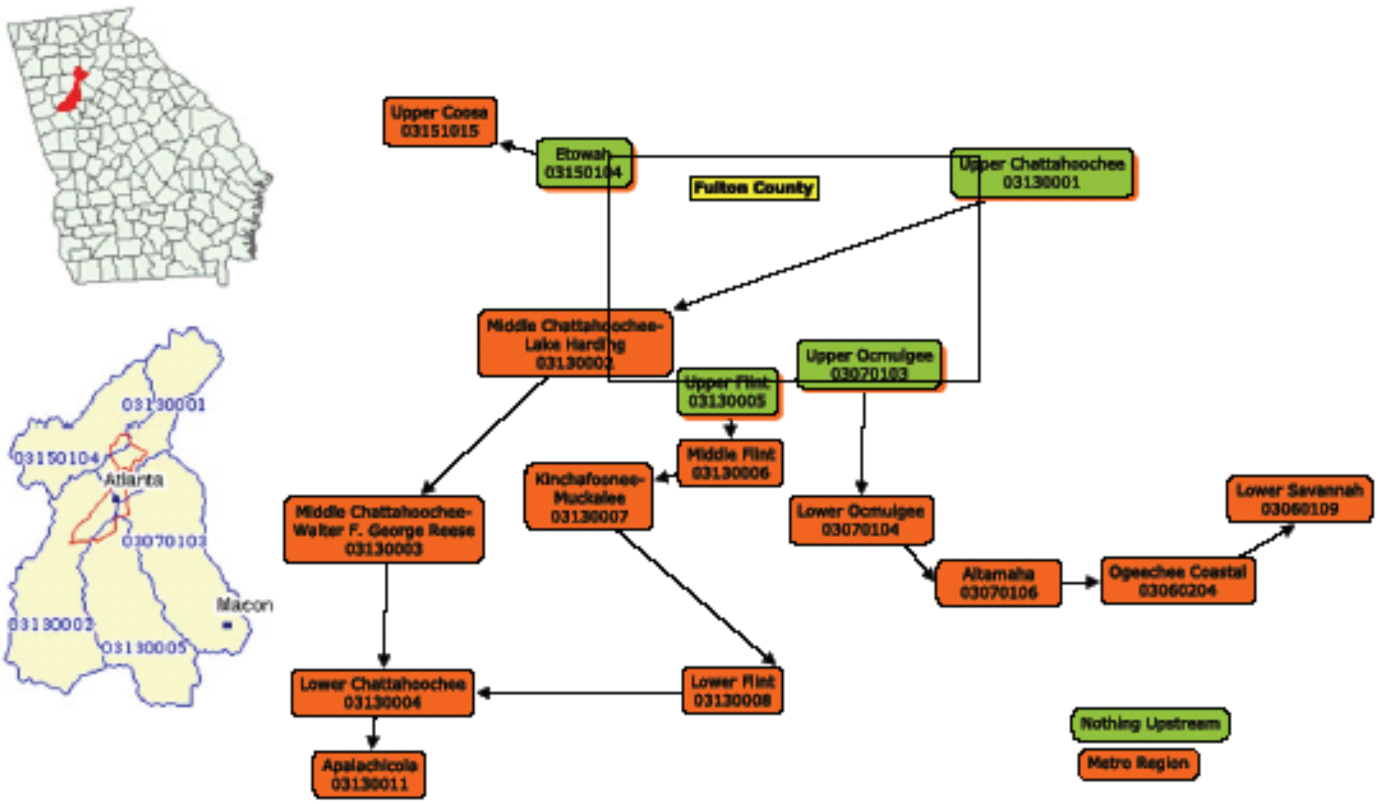


Figure 7. Upstream/Downstream Structure of Fulton County

<u>Political, Economic and Environmental Values</u>

Five questions on the survey related to respondents' political, economic, and environmental values. With the aim of creating one or more scales to represent values, responses corresponding to these questions were submitted to factor analysis. The variables loaded on a single factor, as shown in Table 10 below, and the alpha score was determined to be 76.

Table 10. Factor Analysis of Variables Pertaining to Values

Component Matrix(a)	Component
"Less government"	.805
"Property rights"	.826
"Emphasize environment over economy"	-.628
"Market should guide development decisions"	.691
"Local government"	.610

Extraction Method: Principal Component Analysis.

These variables were combined, using suggested methods, by multiplying the score for each respondent on each variable by the factor score for that variable (UCLA 2007). The variable was named "pro-conservative" (see Weible, 2005).

Organizational Affiliation

Organizational affiliation was asked of respondents in two ways. First, respondents were asked to check off all relevant affiliations from 10 choices (see survey in Appendix A). Second, they were asked to select one affiliation that best represents their primary affiliation with respect to their participation in the state water planning process. I used their primary affiliation in this analysis, however I recoded organizational affiliation into five categories, since the other categories had too few members to analyze: agriculture, environmental group, business/industry, water utility or facility, and local government.

2.5 Summary Statistics

Conceptual Bounding

There were two Conceptual Bounding Clusters, CB1 and CB2 that were used as dependent variables in this analysis. CB1 and CB2 are standardized continuous variables that reflect two "idealized" representations of conceptual boundaries that emerged from the collective responses of the survey respondents and were extracted using cluster analysis. Details on construction of conceptual bounding clusters can be found in Appendix D. Both CB1 and CB2, being standardized z-scores, have a mean of zero. CB1 has a minimum of -1.34 and a maximum of 1.02, with a standard deviation of .492. CB2 has a minimum of -1.13 and a maximum of .95 with a standard deviation of .451. Since CB1 and CB2 are made up of a series of threats, goals, strategies, and assumptions about water and water planning, I include below summary statistics for each of these categories.

Problem Drivers: Respondents were asked to rank problem drivers on a scale of 1 to 4, with 1 being no threat, 2 being little threat, 3 being moderate threat, and 4 being major threat. The greatest threats to water resources in the state was perceived to be "droughts or other climatic events" and "urbanization" – the mean respondent ranking of these two threats was 3.5, or between a moderate and a major threat. The mean respondent ranking of most other categories of threat was between 2 and 3, or between a little threat and a moderate threat. The mean respondent ranking of threats posed by wildlife was 1.6, showing that wildlife is not perceived as an important threat by the majority of respondents. Table 11 below summarized respondents' rankings of perceived threats.

Table 11. Descriptive Statistics: Mean Identification of Problem Drivers

Problem Driver	N	Mean (scale of 1 – 4)	Std. Deviation
Water Pollution From Urban Areas	78	**3.50**	.752
Droughts or Other Climatic Events	78	**3.45**	.573
Water Used by Urban Areas	77	**3.43**	.751
Water Used by Other States	75	**3.01**	.862
Water Pollution by Agriculture	78	**2.91**	.885
Water Pollution by Business	78	**2.88**	.821
Waste by Wastewater Treatment	77	**2.83**	.801
Water Pollution From Septic Systems	75	**2.79**	.874
Water Used by Agriculture	78	**2.71**	.839
Water Used by Business	78	**2.68**	.875
Water Used by Septic Systems	77	**2.61**	.920
Pollution by Wastewater Treatment	77	**2.44**	.866
Excessive Government Regulation	75	**2.36**	1.111
Water Pollution by Other States	72	**2.32**	.819
Water Pollution by Wildlife	78	**1.78**	.816
Water Used by Wildlife	77	**1.40**	.591

Goals: Respondents were asked to rank seven possible goals of water planning. Goals were ranked on a scale of 1 to 5, with 1 indicating the lowest priority and 5 indicating the highest priority. The goal with the highest mean respondent score, 4.7, was "ensure clean drinking water." The mean respondent score for "protect the environment" – 4.16, was the only other goal whose mean rating put it between the highest and second highest priority. The mean respondent ranking for most other goals was between 3 and 4, with the exception of "protect recreational opportunities," which the mean respondent rating was 2.97. In Table 12, below, the mean respondent rating for each goal is detailed.

Table 12. Descriptive Statistics: Mean Prioritization of Goals

GOAL	N	Mean (scale 1 – 5)	Std. Deviation
Ensure Clean Drinking Water	77	4.70	.650
Protect the Environment	77	4.16	.904
Protect Georgia's Water Resources	77	3.36	1.180
Maximize Food Production	77	3.34	1.034
Foster Economic Growth	77	3.31	1.103
Minimize Conflict	77	3.30	1.101
Protect Recreational Opportunities	77	2.97	.946

Strategies: Respondents were asked to indicate whether each of 5 potential strategies for achieving water planning goals is "unacceptable" (1), "may be acceptable" (2), or "favorable" (3). The mean rating of all but one solution / policy proposal was between "may be acceptable" and "favorable." The mean rating for the solution of "develop market based approaches" was slightly below "may be acceptable." In Table 13, below, the mean rating for each solution/policy proposal is shown.

Table 13. Descriptive Statistics: Mean Preference for Policy Strategies

STRATEGIES	N	Mean (scale 1 – 3)	Std. Deviation
Voluntary Action	77	2.53	.640
Regulations and Enforcement	77	2.38	.608
Technological Solutions	74	2.38	.656
Property Rights	69	2.28	.684
Market-based Approaches	72	1.90	.715

Underlying metaphors concerning water and water planning: Four questions were designed to explore basic metaphors relating to water and water planning. Each of the questions was developed from a paraphrase of something said by one or more participants at a BAC meeting. With the exception of respondent opinions about the question of whether water resources are finite (they overwhelmingly agreed) levels of respondent agreement or disagreement with these statements were generally well distributed, as can be seen in the below bar graphs in Figure 8.

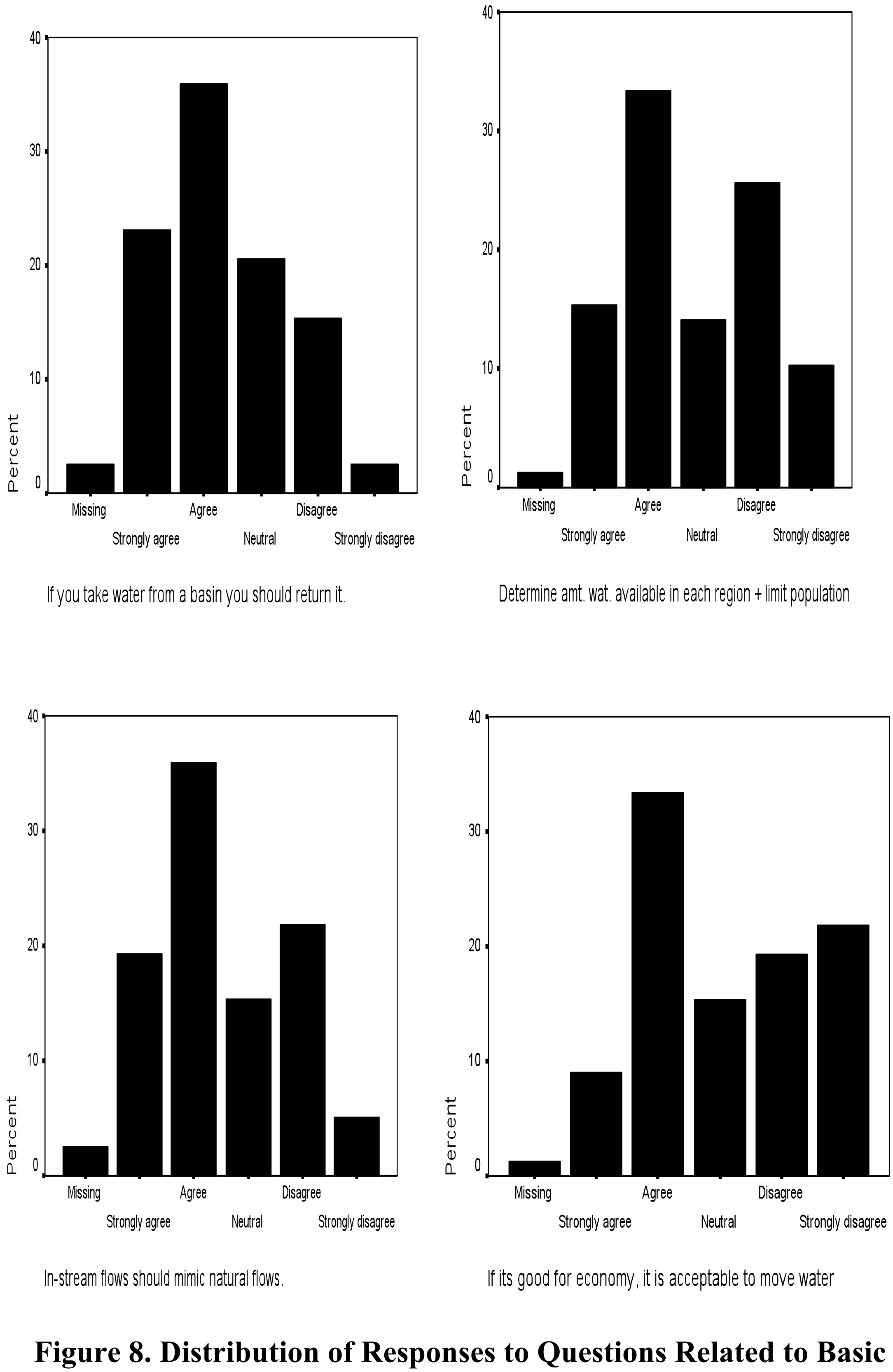


Figure 8. Distribution of Responses to Questions Related to Basic Metaphors Underlying Water and Water Planning

Managerial Bounding**:** Tables 14 and 15 below show the distribution of respondents' choices for managerial bounding when asked the question in two different ways: first, what boundaries would they assign if the regions are designed to guide planning; and second, what boundaries would they assign if the regions are designed for authority and decision-making. For both questions, respondents chose watersheds/river basins as the favored boundary type for planning regions. However, the percentage of respondents choosing watersheds/river basins was significantly lower (from 70% down to 50%) if the regions are empowered with decision-making authority.

The below tables show managerial bounding results in two ways, a) coded in binary form for "non-watershed" versus "watershed-based" managerial bounding; and b) detailed responses coded in ordinal fashion, smallest to largest, for scale-size

Table 14. Managerial Bounding Choices: Planning Only

For planning purposes only	**Frequency**	**Percent**
Not Watershed	**22**	**28.6**
Watershed	**55**	**71.4**
Counties	5	6.5
Small watersheds	15	19.5
SWCDs	6	7.8
RDCs	4	5.2
GA's 14 basins	29	37.7
State of GA	7	9.1
Interstate basins	4	5.2

Table 15. Managerial Bounding Choices: Authority

For authority and decisions	Frequency	Percent
Not Watershed	**37**	**48.1**
Watershed	**40**	**51.9**
Counties	8	10.4
Small watersheds	7	9.1
SWCDs	2	2.6
RDCs	4	5.2
GA's 14 basins	29	37.7
State of GA	23	29.9
Interstate basins	1	1.3

Place as Attachment/Identity/Commitment: 21 respondents (27%) self-identified as living in an urban area of the state; 30 respondents (39%) self-identified as living in a rural area of the state, and 26 respondents (33%) self-identified as living in a suburban or mixed area of the state.

Place as Spatial Location: 20 respondents (26%) live in a place coded as "upstream" by the methods described above; 44 (47%) live in a place coded as "midstream", and 14 respondents (18%) live in a place coded as "downstream."

***Values*:** There was a wide diversity in levels of agreement for each of the value-related questions; however, the responses were skewed for three questions. With regard to the statement "decisions about development are best left to the economic market, responses were skewed to the "disagree" side. With regard to the statement "when trade-offs need to be made between the environment and economic development, the environment should come first" skewed to the "agree" side. Tables B34-B38 in Appendix B depict the diversity of agreement levels by respondents with respect to the questions on political, environment, and economic values.

These questions were combined using the methods explained above, to create a standardized "pro-conservative" scale, the mean of which was 0, with a minimum of -2.35, a maximum of 2.43, and a standard deviation of 1.

***Organizational Affiliation*:** Of the 78 respondents, 10 (13%) represented an agricultural group, 17 (22%) represented a business or industry group, 12 (15%) represented an environmental group, 22 (28%) represented local government, 10 (13%) represented a water utility, and 7 (9%) represented none of the above. A detailed breakdown of respondents' primary and secondary affiliations is given in Appendix B.

2.6 Analysis of Results

Q1: How is conceptual problem bounding influenced by a BAC member's place?

In order to determine the effects of different stakeholder characteristics on the conceptual bounding variables, t-tests for comparison of mean were used to compare mean scores on the Conceptual Bounding Cluster scales for various groupings of respondents. For CB1, the mean score for individuals affiliated with an environmental group was -.17, which was .53 lower than the mean score for the sample as a whole (significant at the .001 level). For CB1, the mean score for individuals located in counties coded as "upstream" was .09, which was .23 higher than mean score for sample as a whole (significant to the .05 level). Affiliation with a rural versus urban place did not significantly affect mean scores for CB1and CB2. See Appendix G for conceptual bounding comparison of means tables.

Finally, in order to control for affiliation and values, as measured by the pro-conservative score, and test the particular significance of the place variables, linear regression analysis was done. Results of this analysis are shown in Tables 16 and 17.

Table 16. Conceptual Bounding Cluster 1: Linear Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.648(a)	.421	.361	.39625

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
.1	(Constant)	-.200	.184		-1.088	.280
	AG	.362*	.186	.285	1.950	.055
	BUS	.429***	.158	.346	2.718	.008
	GOV	.320**	.149	.298	2.149	.035
	WAT	.437**	.173	.300	2.528	.014
	UP_DOWN	-.061	.073	-.081	-.835	.407
	PRO_CON	.210***	.055	.426	3.801	.000
	RURAL	.029	.102	.029	.284	.777

The results of this regression indicate that, controlling for the influence of organization and values, the place variables are not significant. As compared to those affiliated with environmental groups, being affiliated with a water utility, business, agricultural group, or local government (listed from highest to lowest) was associated with a significantly higher score on CB1. Furthermore, a higher score on the pro-conservative scale was associated with a higher score on CB1, which indicates a relationship between being pro-conservative and a way of conceptually bonding water problems that focuses on, among other things, the aspects of water related to economic growth and production, strategies for dealing with problems, related to technological innovation and market solutions, a concern about the impacts of excessive regulation, and assumptions about water planning that allow for moving water to meet economic needs.

The adjusted R-square score of .421 is an indication of the robustness of this model.

Table 17. Conceptual Bounding Cluster 2: Linear Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.495(a)	.245	.168	.41412

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.324	.192		1.688	.096
	AG	-.251	.194	-.215	-1.290	.201
	BUS	-.181	.165	-.160	-1.098	.276
	GOV	-.154	.155	-.157	-.991	.325
	WAT	-.132	.181	-.099	-.731	.467
	UP_DOWN	-.118	.076	-.172	-1.550	.126
	PRO_CON	-.179***	.058	-.396	-3.102	.003
	RURAL	.130	.106	.140	1.222	.226

The results of this regression indicate that, controlling for the effects of organizational affiliation and place, a higher score on the pro-conservative scale was associated with a lower score on CB2. No other variables were significant. Thus, pro-conservatives were less likely to focus on threats related to human and sectoral water uses, goals related to protecting Georgia's water resources from other states and protecting the environment, strategies of voluntary conservation and regulation. Their underlying metaphors were also less likely to have to do with on water as a part of nature.

Other than the pro-conservative score, there were no other significant connections between either the place or the organizational characteristics of a stakeholder and Conceptual Bounding Cluster 2. To say this another way, though place and organization does have an influence on how well a stakeholders' view coheres to CB1, stakeholders across groups and affiliations share common views in terms of CB2.

<u>Q2: How is managerial problem bounding influenced by a BAC member's place?</u>

Comparison of means, both with respect to the binary score pertaining to whether a respondent chose a watershed or non-watershed type of boundary, and the ordinal scale pertaining to the size of the partitions, was used to explore the relationship between stakeholder characteristics and managerial bounding. For the variable relating to managerial bounds that have the authority to make decisions, T-tests for comparison of means showed that:

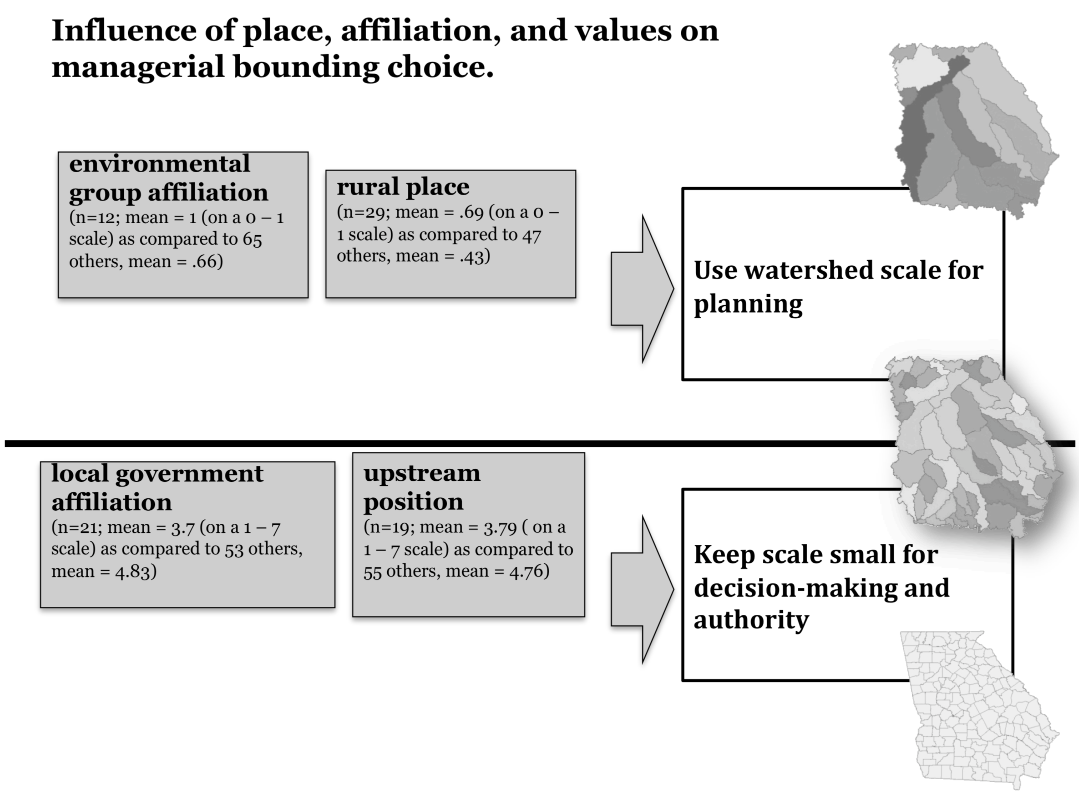
- Being affiliated with an environmental group, self-identifying as coming from a rural place, and valuing the environment over economic growth is positively associated with selecting a watershed-based demarcation for managerial bounding.
- Being affiliated with a local government group, coming from an upstream location, and agreeing with the value statement "the best government is local government" is positively associated with the selection of a smaller scale

demarcation for managerial bounding. The below image displays these results, and includes the mean scores. All were significant to the .01 level. Results of T-tests can be seen in Appendix H.

- There were no significant results for managerial bounding if boundaries are construed for planning only, and have no authority to make or implement decisions.

Figure 9 below depicts visually the statistically significant effects of stakeholder characteristics on managerial bounding.

Figure 9. Stakeholders Characteristics Affecting Managerial Bounding



Logistic regression analysis was used to control for the influence of organizational affiliation and values on the influence of place on whether the respondent chose a watershed or non-watershed structure for managerially bounding. The results of this analysis are shown in Table 18 below.

Table 18. Managerial Bounding: Logistic Regression Analysis

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	82.340	.259	.346

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1(a)	AG	-2.507**	1.096	5.228	1	.022	.082
	BUS	-.568	.905	.393	1	.531	.567
	ENV	1.333	1.042	1.635	1	.201	3.792
	GOV	-1.489*	.892	2.787	1	.095	.226
	RURAL	2.334**	.738	10.005	1	.002	10.317
	PRO_CON	.804**	.368	4.775	1	.029	2.233
	UPSTREAM	-1.717**	.763	5.059	1	.025	.180
	Constant	.448	.731	.375	1	.540	1.565

The results of regression analysis indicate that, controlling for pro-conservative values, being affiliated with an agricultural group or local government (as compared to being a water professional) was associated with a decreased likelihood of choosing watershed-based boundaries for authority and decision-making, as was being positioned in an upstream county. Being identified with a rural county, however, was associated with an increased likelihood to choose watershed-based boundaries. Additionally, a higher score on the pro-conservative scale was associated with an increased likelihood in choosing watershed-based boundaries for authority and decision-making. Regression analysis using managerial boundaries for planning purposes only showed no significant results.

2.7 Review and Discussion of Results

Overall, the results of the empirical analysis indicate that, as expected, organizational affiliation played a role in how stakeholders both conceptually and managerially bounded Georgia's complex water problems.

With regards to question 1 for the research, members of environmental groups were less likely to see water as a commodity and engage in other forms of conceptual bounding as captured in Conceptual Bounding Cluster 1, and more likely to select watersheds to guide state water planning and management. Interestingly, organizational affiliation had no effect on Conceptual Bounding Cluster 2. This indicates that belonging to an environmental group predisposes one to think less like members of other organizations in terms of thinking that water can be moved, favoring economic growth, fearing regulation, etc., but that members of all affiliations are equally likely to conceptually bound Georgia's water problems by focusing on protecting the environment, promoting behavior change through voluntary action and regulation, etc. In a nutshell, this implies that, while all stakeholders are equally attentive to the environmental dimensions of water problems in Georgia, members of environmental groups are less attentive than others to economic related concerns.

This sheds some insight as to how patterns of agreement and disagreement may unfold, and efforts at persuasion may sometimes be misplaced. That is, environmentalists' energy may be misplaced if they are expending a lot of energy assuming that members of other groups fail to see that water is a limited resource, and don't care about protecting the environment, etc. The real reason for disagreement or conflict, on the contrary, may be environmentalists' failure to see and/or validate alternative goals for water planning that include growing the economy, maximizing food production, and defending against stifling regulation. The potential for conflict still exists, of course, when it comes to deciding just how "sacrosanct" to use the words of one of the participants quoted above, the boundaries of river basins will be.

What may be more relevant than organizational affiliation in shaping the extent to which stakeholders conceptually bound problems are values, here as construed on a "pro-conservative" scale. Survey respondents scoring high on the pro-conservative scale were less likely to bound problems in the way typified by Conceptual Bounding Cluster 2, in which water is seen as a part of natural systems, with the goal being to protect the environment, and the threats being the usual suspects of business, industry, agriculture etc., and more likely to bound problems in the way typified by Conceptual Bounding Cluster 1, in which water is seen as a commodity that promotes productivity and economic growth.

Place, whether conceived as a form of attachment/identity/commitment or as relative spatial positioning was not found to be important in shaping stakeholders' conceptual problem boundaries.

With regards to question 2, the results indicate that being affiliated with an agricultural group or local government was associated with a decreased likelihood of choosing watershed-based boundaries for authority and decision-making, as was being positioned in an upstream county. Being identified with a rural county, however, was associated with an increased likelihood to choose watershed-based boundaries. Additionally, a higher score on the pro-conservative scale, controlling for organization and place, was associated with an increased likelihood in choosing watershed-based boundaries for authority and decision-making. This last finding is somewhat puzzling, and is other than expected.

These findings, and the operationalization of variables– in particular the innovative construction of the Conceptual Bounding Clusters – should inform the further development and articulation of a theory of problem bounding. The next step in the development to such a theory is to develop empirical methods for linking place and specific ideas relating to the spatial and temporal scale of environmental problems. Further discussion of the implications of the findings for policy and institution building is reserved for Chapter 3.

2.8 Limitations

Before further exploring the implications of the empirical aspect of the research I will discuss some important limitations to the data and subsequent analysis.

First, although the sample was relatively reflective of the population of Basin Advisory Committee members, the Basin Advisory Committee members were not necessarily representative of the Georgia public. I did attend several "Town Hall" meetings organized by the Environmental Planning Division, and of course I was exposed to the general media barrage concerning these issues, in particular with the onset of a drought and the continuing haggling over water between Georgia and neighboring states who share a common river basin (and are either upstream or downstream from Georgia) (Shelton 2007; Shelton and Kemper 2007; Shelton and Opdyke 2007; Woolsey 2007;

Woolsey Oct. 21-27, 2007). While basin advisory members were selected by the EPD with an eye to representing the diverse views of the state, it is also true that their selection was largely achieved through EPD staff members reaching into their networks. Although the survey did not include basic demographic data, it was clear from observing the process that the large majority of advisory members were white, well educated, and male. The results should be interpreted with this in mind.

Second, by administering the survey only after participants had attended five meetings, it is possible that a sort of "convergence" of views about water and water problems already resulted as a function of the collaboration that took place. In an ideal world, I would have done a before and after survey of advisory committee members' problem bounding. As it is, the possible influence of meeting attendance itself should be considered. I ran control for the number of meetings attended by a BAC member to partially check this; it had no effect on the results, and was subsequently not included in further analysis.

Third, while the response rate of 41% was decent, the total n of 78 respondents limited the kinds of statistical analysis that could be done and the robustness of the statistical analysis that I did do. While this limits the attributions of causality that can be made, it does allow for exploratory analysis that goes a long way towards theory building, which was the purpose of this study. Furthermore, it should be kept in mind that survey analysis was used to empirically explore elements that discourse theorists have previously studied by the use of interviews.

Fourth, the Conceptual Bounding Clusters that were created are clearly over-simplifications. While they are useful for comparing the answers of actual survey respondents against an idealized example, they should not be taken as characterizing any group or class of stakeholders. In fact, some of the most interesting distinctions can be made in looking at how groups don't quite fit into the clusters created. This leads to the possibility that it may make sense to look for three or four Conceptual Bounding Clusters instead of just two. In my participant observation, it seemed clear that advisory members from agricultural groups shared many ideas about water problems and their solutions. A richer understanding of the differences in how members of agricultural groups and other affiliations bound problems in Georgia might be possible with Conceptual Bounding Clusters conceived at a finer resolution. For the purposes of this analysis, I chose to keep things relatively simple by limiting the clusters to two.

In the final chapter of this dissertation, implications of the results for policy and managerial design are discussed.

CHAPTER 3

POLICY IMPLICATIONS

In Chapter 3, implications of the research for the development of institutions to deal with complex environmental problems are discussed. In particular, the results of empirical research on problem bounding of water issues in Georgia are drawn on to provide fresh insights into some thorny issues related to policies and institutions that "make space" for dealing with environmental problems that spill over traditional political and administrative boundaries. Implications of the results are discussed with regards to the design of the kind of bold process that the state of Georgia was and is engaged in, which integrates technical expertise on the physical dynamics of a problem with representation by a multiplicity of stakeholders with different views and interests. I have organized the implications into three points:

1. Place and the paradox of problem bounding
2. Ecological boundaries and power
3. Confronting the spatial geometry of complex environmental problems

After discussing each of these points, I will end Chapter 3 with a discussion of possible directions for future research.

3.1 Place and the paradox of problem bounding

As has been previously argued, but will be here stated explicitly, a basic assumption of this research is that environmental planning institutions should, in one way or another, allow for representation by the variety of stakeholders who will be affected by their decisions. Additionally, the structure of the institution itself should be articulated in such a way that there is room for discussion and deliberation relative to the problem as it is understood by affected stakeholders.

This ambition highlights a paradox: in trying to deal with a given problem, say water in Georgia, we can't know who to invite to the table without knowing which individuals, in their conceptual bounding processes, identify it as a problem. But, without inviting people to the table we don't know the myriad ways in which a problem is conceptually bounded. Faced with this chicken and egg interdependence between the boundaries of various environmental problems as perceived by potential stakeholders, and the boundaries selected to constitute the scope of stakeholder representation, organizers of collaborative processes have to make some assumptions about the ranges and types of individuals who are in fact stakeholders with respect to the problem at hand.

One strategy to ensure that multiple perspectives on a problem are included in a deliberative process is to include as wide a diversity of stakeholders as possible, assuming that most of the variety of problem definitions and multi-scalar impacts will be accounted for. Unfortunately, however, research seems to show that each incremental increase in the scope of representation leads to an increase in transaction costs as well as an increase in the likelihood of intractable conflicts (Koontz and Johnson 2004; Lubell

2004). Widening the geographic scope of representation also has the potential to disempower small groups of local stakeholders – who may be among the most strongly affected by decisions - if a process includes a large number of citizens over a wide geographic expanse (perhaps with a small stake each, but with great power in aggregate) (Blomquist and Schlager 2005).

In a paper specifically dealing with watershed management, Chess et al. propose a "hybridization" approach to the issue of selection of representative stakeholders (Chess, Hance et al. 2000). Such an approach would focus on including stakeholders who represent diversity as conceived in multiple ways: demographic diversity, geographic diversity, key organizations and structures of power, and disinterested parties.

The findings from the empirical research are aligned with at least some of Chess's suggestions, and shed some light on how the paradox discussed above might be dealt with. As others have found, my research showed that organizational affiliation affects conceptual problem bounding. Additionally, the findings showed a particularly strong role for "pro-conservative" values. This points to the importance of adding an additional form of diversity that Chess did not consider: diversity of values. While recognizing the importance of value diversity does not by itself transcend the paradox mentioned above, it does point to a possible role for social survey methods, in particular those that focus on values, in guiding the selection of stakeholders who will participate in collaborative decision-making.

Finally, the main focus of this research was on the role of place, conceived in two ways, on conceptual problem bounding. Starting with the theoretical assumption that an individual comprehends an environmental problem from some place within a problem system, and then asking about the various ways in which that place can manifest, the kind of work done in this dissertation can provide depth and richness to what it means to achieve, in practical terms, the kinds of diversity that Chess and others propose. Place was conceived 1) as a form of attachment to, identification with, and/or commitment to a particular kind of geography – here, an urban, rural or suburban setting; and 2) as a spatial position in relation to larger ecological dynamics, in this case the upstream downstream dynamics of Georgia's river basins and watersheds. In this study, after controlling for the influence of organizations and values, the place variables were not shown to be influential in shaping conceptual problem boundaries, although they were influential in shaping managerial boundaries.

This suggests that, in their attempts to understand complex problems, people are not limited by the specifics of their locale, but that where they are in the system does play a role in how they think the world should be organized for the development of institutions. My findings indicate, for example, after controlling for organizational affiliation and pro-conservative values that stakeholders who identified living in a rural place were more likely to select watershed-based boundaries for water planning in Georgia. At the very least, this finding should encourage those selecting representatives for collaborative planning endeavors to include stakeholders with rural place attachments. More generally, it should begin to parse out the ways in which geographic diversity can be sampled in the decisions about stakeholder representation that move beyond the paradox of problem bounding.

3.2 Ecological Boundaries and Power

As discussed at several points in the dissertation, there is a great deal of effort being expended for states, and countries, to embrace watersheds or other types of ecological boundaries as the appropriate type of boundary for engaging in environmental policy-making (Ziemer and Reid 1997; Chess, Hance et al. 2000; Leach and Pelkey 2001; Kauffman 2002; Habron 2003; Moore and Koontz 2003). As states and nations begin to grapple with cross-boundary environmental problems by developing new boundaries based on ecological ways of organizing space, it is useful to consider the nature of authority that will be assigned to these new entities, and how they will interact with pre-existing managerial and infrastructural realities. As is clear from the discrepancy between the 71% of survey respondents favoring watershed-based boundaries for *planning purposes* and the 20% drop in that choice if those boundaries are given *decision-making authority*, the question of power and of the relationship of ecologically derived boundaries to other types of boundaries is something that survey respondents were sensitive to.

In the case of the Georgia water planning process, it is certainly not the case that the articulation of sub-state regions is taking place against a blank slate. The legislation mandating the planning process stipulated that any plan must be consistent with pre-existing law and jurisdictional authority. These jurisdictional authorities include the authority that derives at the level of the state, at the level of the 159 counties, and also at the level of pre-existing state-mandated water management institutions. Before the planning process started, the Metropolitan North Georgia Water Planning District, composed of 16 counties in and around metropolitan Atlanta, was such a state-mandated institution.

From an infrastructural perspective, it is also important to consider that the "natural state" of water in Georgia has already been significantly altered by engineering interventions. Significantly, within the metropolitan Atlanta region a large volume of water is piped between basins to support the population. Figure 10 below shows the major Inter-basin transfers in Georgia.

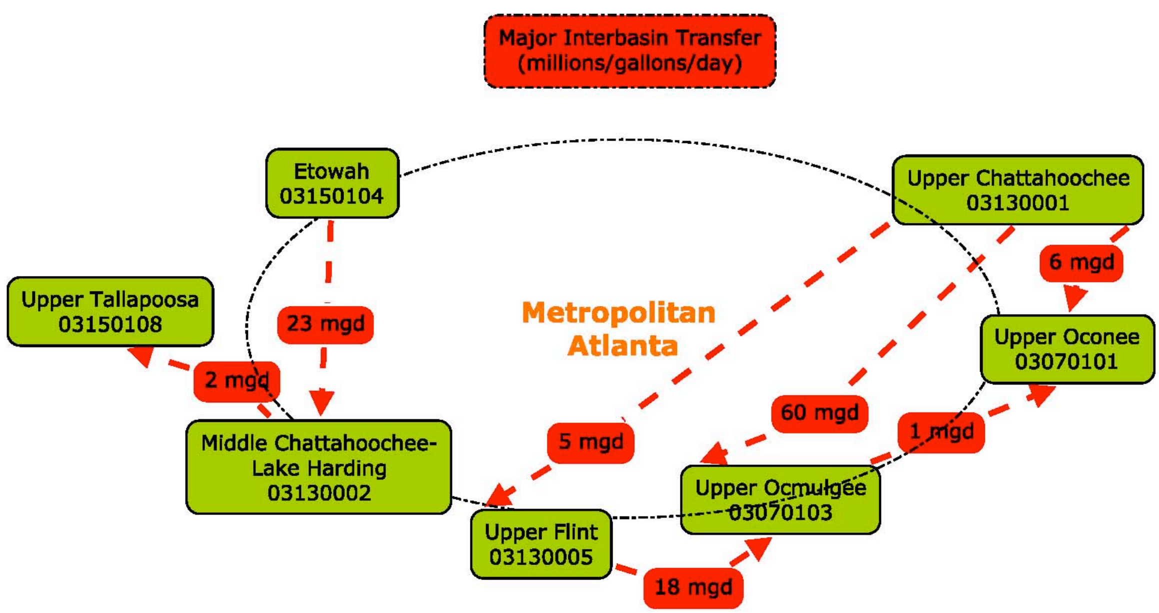


Figure 10. Major Inter-basin transfers in Georgia.

As the various contributors to the new water plan engaged in the question of assigning sub-state boundaries, they inevitably had to confront the question of how newly emerging sub-state regions would relate to (or make obsolete) these pre-existing jurisdictional and infra-structural realities. For example, if watershed boundaries were truly to be adopted across the state for guiding water-planning and management, it would have been necessary either to create an "overlay" district that operates in parallel to the MNWPD, or, more radically, to convince the legislature to disband the MNWPD. Additionally, the adoption of watershed boundaries would necessitate an overlay over the lines of counties, which are not congruent with watershed boundaries.

In the final delineation of sub-state regions, instead of overlays, predominance was given to the sovereignty of the MNWPD and to Georgia's counties, as can be seen in Figure 11[11], below.

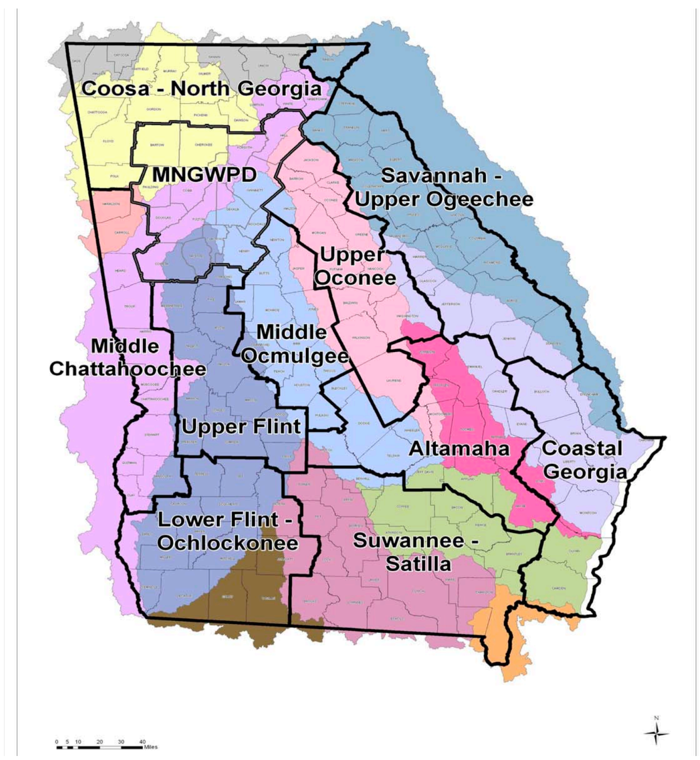


Figure 11. Final Delineation of Water Planning Regions

[11] http://www.georgiawatercouncil.org/Files_PDF/water_plan_20080109.pdf, accessed November 2008

While a positive aspect, from the perspective of an ecologist, of this final map is that watershed demarcations are indeed given an important role, that role is limited and constrained to the extent that watershed boundaries conflict with boundaries of metropolitan Atlanta and boundaries of counties. As can be judged by reports in a popular Atlanta community newspaper (Wheatley 2008), environmentalists in particular are not happy with this result. The reason for their concern is clear: While it is presumed that state level policy-makers will operate with cognizance of watershed dynamics, it appears with the current structure that stakeholders in metro Atlanta will not have to interact with stakeholders located at points downstream in planning and management related to Georgia's water issues.

While the political negotiations and machinations, if any, that led to this outcome were not observed in this study, the results found here do provide some insights that are relevant in evaluating whether there might have been another alternative and what it might have taken for this alternative to be realized. What my research suggests is that it may have been the perception on the part of the final decision-makers that the new boundaries would or should have *decision-making authority* that led to the outcome that emerged. Thus, local government officials – who as we also know from the data are likely to select smaller scales for engaging in decision making – and individuals representing the interests of business and commerce may have been concerned that adopting watershed based boundaries across the board would, by giving the power to stakeholders downstream of the Atlanta metro area to make decisions affecting the

Atlanta metro area, threaten Georgia's economic competitiveness and opportunities for development.

Had this perception and the concern related to it been countered by a clearer understanding that watershed boundaries would only have a planning role[12], the threat imposed – real or perceived – by watershed-based institutions on the sovereignty of local counties and the state as a whole might have been ameliorated. If this had been achieved, the overlay model discussed above might have been a more likely outcome. While it perhaps would have created more complications to have more than one institutional entity, with different kinds of roles and authority, overlapping in similar regions, current scholarship calls for exactly this scenario. Specifically, a main theme of Ostrom's work has been the need for "polycentric" forms of government (Ostrom 2005), which as I understand it means that we should have multiple complementary institutions, working at multiple scales to deal with the complexity of the problems we face.

The trade-off, of course, of watershed based boundaries without decision-making power is that they would have to function through persuasion, catalyzing communication, and education rather than sheer force. A good metaphor to develop this idea further is to point to the essential (and sometimes blurry) distinction in the United States between Religion and the State. Clearly, the ideas developed and nurtured in religious institutions have a profound impact on social policy. This is a function not of their power, but of their ability to capture the hearts and minds of people who have the wherewithal and capacity to influence the structures of power.

[12] This was in fact explicitly stated by EPD staff members at several meetings I attended. What is not known is the extent to which the ultimate decision-makers embraced this understanding.

Drawing on this metaphor, perhaps the role for collaborative watershed based institutions is best conceived not as a vehicle for the exercise of public authority but as a locus for ecologists and other environmental scientists to interact with a variety of stakeholders across lines delineating traditional authority. While the role of religious institutions is to explore the moral and theological implications of our spiritual nature, the role of environmental institutions would be to explore the moral and sustenance-based implications of our ecological embeddedness by monitoring environmental systems, organizing collaborative discussion, educating the public, etc.

To take the metaphor comparison further: as a country, we seem to be embracing the notion that, due to the effectiveness of faith-based programs to make a difference in social problems that are intractable through other avenues, it is a good idea to direct public tax money to these sorts of programs. Similarly, environmental planning institutions based on watersheds or other ecological dynamics, to be effective, need public funding. Funding is necessary to discern and monitor the state of the system, to develop and share the capacity necessary to do so, to organize and facilitate public processes and educational endeavors, and so on (Grillo 2007). Perhaps if it were made crystal clear that these institutions will be relegated to a planning role such funding would be more forthcoming.

3.3 Confronting the spatial geometry of complex environmental problems

For the past several decades, the dominant way that the world of environmental policy and problem solving is partitioned is according to physical media: is it a problem with air, water, or land? With a move toward watershed or landscape level planning, interrelationships between two or more media are considered. A focus on the unique spatial aspects of environmental problems – their multi-scalar nature, their place-based particularities, as well as the particular dynamic geometries of specific problems – points to a different way of organizing our minds and our institutions for environmental problem solving. Thus, instead of asking if a given problem is a water problem, an air problem, a water/land problem, and so on, we might ask if it is an upstream-downstream linear problem with a fractal composition, a near-far planar problem, and so on. These spatial characterizations of environmental problems specifically take into account both ecological dynamics and the specific ways that humans are embedded within and related to those dynamics.

The empirical evidence from this research indicates that such an approach may be founded on solid ground. There was evidence that, both with respect to the way stakeholders conceptualize the boundaries of water problems in Georgia, and chose among alternative "lines on a map" for managing them, that they were influenced to some extent by whether they were located at a point within a given watershed that was either relatively upstream, mid-stream, or downstream. When values and organizational affiliation were controlled for, being upstream still resulted in a decreased likelihood by stakeholders to select managerial boundaries based on the lines of watersheds. This is at least cautious empirical validation of the reasons, discussed by several other authors (Dufournaud and Harrington 1990; Fischhendler and Feitelson 2003; Fischhendler and Feitelson 2005; Feitelson 2006), for why, although watershed planning seems like such a good idea, it is not implemented in practice as much as would seem warranted.

The air/water/land view of environmental problem-solving doesn't quite know what to do about this reluctance on the part of some stakeholders, merely as a function of their spatial positioning with respect to a problem, to organize problem-solving efforts solely according to an ecologists' view of the world. If, however, we were to incorporate an explicit recognition of these upstream/downstream or other spatial effects, then some possible ways past this resistance become evident. In essence, the suggested prescription, after carefully study the relationship between the ecological dynamics of a problem and its human geometry, is to develop policies that specifically address and account for interactions and possible discrepancies between the two.

In essence, if ecological dynamics result in upstream/downstream dynamics that cause people to pay attention to too small or restricted a scale to engage in collaborative problem solving, the job of policy is to expand the scale and reverse upstream/downstream imbalances. An example: throughout participant observation during the water planning process, a point that kept being raised by a small but vocal cadre of BAC members and other observers was the possibility of constructing desalination plants to create more water, thereby making the drought and the need to engage in costly conservation measures obsolete. My general sense in listening to the experts is that this solution is deemed far too costly given the rising cost of energy, especially given that Atlanta – who would be the main user of the increased abundance – is hundreds of miles away from the coast and over one thousand feet above sea level. Furthermore, given the over-arching context of the tri-state water wars, from a Georgian's perspective it does not make sense to make the huge investment if the main result is that more water can now be sent down the Chattahoochee on into Florida: big investment, no change in water availability.

However, imagine if the step was taken to engage in planning and investment across state lines – to expand the scale of our conceptual boundaries beyond the state line and on into the river basins Florida shares with Georgia. This could allow for Georgia to make investments in desalination technology not in Georgia but in Florida, which makes a lot more sense from an efficiency perspective. The result of such an investment would be to reverse, at least in part, upstream/downstream relationships, because it would allow more water to remain in Georgia – in lake Lanier, for use by the growing metropolitan area, etc. At the smaller scale – just thinking within the boundaries of the state, and relying on the Supreme Court to sort out between state issues - Georgians in upstream metropolitan Atlanta have every reason to avoid the accountability that watershed based planning implies. If we start to think creatively and across state lines, however, we might be able to make investments downstream that change the thinking of upstream stakeholders.

This example highlights an important point that should be made explicitly: not all upstream-downstream relationships follow the natural flow of water. Take for example the recent crisis in the mid-west, in which levees constructed downstream caused massive flooding upstream (Davey 2008). In this case, the combination of human engineering and the natural dynamics of flooding resulted in a system where downstream was upstream and vice versa. The challenge for policy makers in this case is to restore the balance in the opposite direction.

These ideas are merely suggestive and meant to inspire more thinking on this general notion that a study of place and spatial positioning might inform an alternate – or perhaps complementary – approach to current methods for partitioning the complexity of the environmental problems and challenges we face.

3.4 Future Research

Several directions for future research can be drawn out of this dissertation. First, there are several possibilities for further analysis of the survey results already obtained. In regards to the specific questions posed in this research, I gathered more data on the "place" of stakeholders than I was able to analyze in the scope of this research. This data included open-ended answers on the watersheds and bodies of water a stakeholder identifies with, the region of the state they feel they represented in the planning process, and the city they work in addition to the one they live in. With some further assistance in coding and perhaps some GIS representations, this data could be used to make a much finer exploration of the role of place in problem bounding.

The survey also included open-ended questions asking respondents to identify threats to water resources – and gave respondents the opportunity to locate the sources of these threats in spatial terms – as well as asking stakeholders to explain their managerial bounding choices. These data could be used to develop new constructions of managerial and conceptual bounding that build on the ones used in the empirical analysis of this dissertation.

The survey also included data that could be used to ask different questions about collaborative processes. Specifically, I asked several questions pertaining to the respondent's level of satisfaction with the process, both from their own perspective and the perspective of their organization. I also asked about their perceived impact on the process, as well as their opinion as to the perceived impact of the planning process on the ultimate development of a state water plan. These questions can be explored along with theories about the ways in which stakeholder views about problems are influenced by their participation in deliberative process. This kind of question in particular is important to ask for the development of effective collaborative institutions that integrate ecological forms of understanding, because they point to the possibility of social learning (Norton 2005). Ultimately (although not with this data set) it will be important to ask to what extent participation in a deliberative process "changes" stakeholders' conceptual and/or managerial bounding of complex problems.

With respect to the Georgia water planning process, another important area for further research is to situate the ideas developed here into their context at a larger scale, namely the scale of the several southeastern states that share common river basins, as shown in Figure 12. Place, both as attachment/identity/commitment and as spatial positioning can be explored in light of how it shapes stakeholder perceptions and choices within the larger multi-state scale.

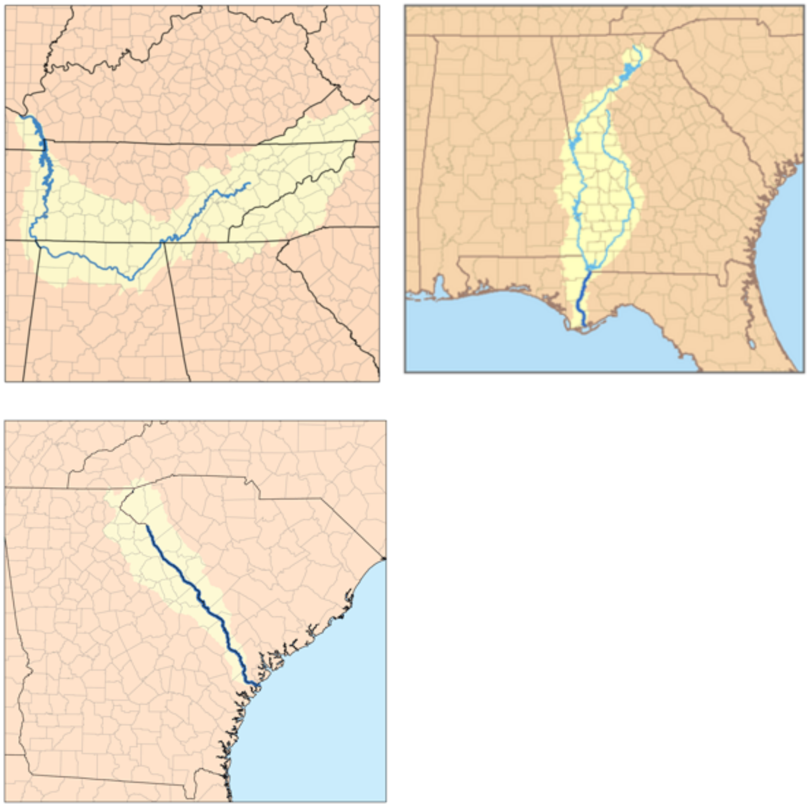


Figure 12. Georgia River Basins at the Multi-State Scale[13]

This type of research has been explored in other scenarios by Cheng and Daniels (Cheng and Daniels 2003; Cheng and Daniels 2005), and the complexities and challenges of water planning in Georgia and beyond would make these kinds of questions a worthwhile pursuit here.

[13] http://en.wikipedia.org/wiki/ACF_River_Basin; http://en.wikipedia.org/wiki/Savannah_River; http://en.wikipedia.org/wiki/Tennessee_river, accessed November 2008

APPENDIX A

SURVEY INSTRUMENT

Georgia Institute of Technology

Survey of Georgia Water Issues and Solutions

Dear Advisor to Georgia's Water Planning Process,

The Georgia Institute of Technology's School of Public Policy is conducting a survey of advisory committee members to Georgia's statewide water planning process; we hope very much that you will be willing to complete this survey. The research is funded by the National Science Foundation, and is being conducted independently of Georgia's Environmental Planning Division (EPD) or any other state or federal agency.

The ultimate aim of the research is to help improve decision making about complex resource issues such as water quality and water availability. Because of your participation as an advisor to Georgia's water planning process for the past year, we would greatly value your perspective on water resource and water planning issues in Georgia.

There are 20 questions in the survey, and it should take approximately 15 minutes to complete. When you are finished, please return your survey using the addressed, stamped envelope provided. We will be accepting completed surveys that are postmarked on or before April 25th.

Your participation is completely voluntary and confidential. No attempt will be made to match survey answers with specific individuals. All results will be reported in aggregate, and raw data will be completely confidential under NSF guidelines. Results of the study will not include any information that could personally identify participants in the study. Please indicate on your survey if you would like to receive a copy of the results.

For more information, contact Dr. Bryan Norton, Professor of Public Policy of the Georgia Institute of Technology at (404) 894-6511 or Paul D. Hirsch, Doctoral Candidate at (404) 512-4473.

If you have questions about your rights as a research volunteer please contact Melanie J Clark, Compliance Officer at Georgia Institute of Technology at (404) 894-6942.

Thank you for your time.

Paul D. Hirsch
Georgia Institute of Technology
School of Public Policy

1. **Which basin advisory committee are you a member of?**

   ○ Savannah & Ogeechee Basin Advisory Committee

   ○ Satilla, Suwanee, St. Marys Basin Advisory Committee

   ○ Oconee, Ocmulgee, & Altamaha Basin Advisory Committee

   ○ Flint & Ochlockonee Basin Advisory Committee

   ○ Chattahoochee Basin Advisory Committee

   ○ Metro Overlay Basin Advisory Committee

   ○ Other (please specify) ______________________________________

2. **Of the following EPD sponsored statewide water planning meetings, which have you attended? Check as many as apply.**

   ○ BAC Meeting 1: Minimizing Withdrawals

   ○ BAC Meeting 2: Maximizing Returns

   ○ BAC Meeting 3: Meeting In-stream and Off-stream Needs

   ○ BAC Meeting 4: Water Quality

   ○ BAC Meeting 5: Integrated Water Quality and Water Quantity Proposals

   ○ BAC Meeting 6: Sub-state Planning

3. **From the list below, please check ALL the organizations or groups you consider yourself to be affiliated with.**

   ○ Agriculture

   ○ Business/Industry

   ○ Environmental conservation

   ○ Outdoor recreation

   ○ City or County government

   ○ State government

   ○ University

   ○ Water and/or Wastewater facility

   ○ Georgia citizen at large

   ○ Other (Please Specify) ______________________________________

4. **From the list below, which category best describes your PRIMARY organizational affiliation with respect to the statewide water planning process, that is, the affiliation that led to your participation in the process.**

   - ○ Agriculture
   - ○ Business/Industry
   - ○ Environmental conservation
   - ○ Outdoor recreation
   - ○ City or County government
   - ○ State government
   - ○ University
   - ○ Water and/or Wastewater facility
   - ○ Georgia citizen at large
   - ○ Other (Please Specify) ____

5. **Please answer the following questions about the places you live, work and recreate**.

   5a. How long have you lived in Georgia? ______________________________

   5b. What city or town do you live in or closest to? _______________________

   5c. How long have you lived there? ___________________________________

   5d. Would you consider where you live to be rural, urban or suburban? ________

   5e. What city or town is your place of work in or closest to?_________________

   5f. What lakes and/or rivers do you recreate in or otherwise feel connected to?
   ____

   5g. What watershed do you live in?_____________________________________

6. **One role of many participants in Georgia's water planning process has been to offer REGIONAL perspectives on water resource issues.**

   What "region" would you say you represent as a participant in Georgia's water planning process?

   ____

7. For the next set of questions, please indicate your level of concern for water quality and water availability in the region you indicated in question 6, and in the state as a whole.

7a. Level of concern about water QUALITY <u>in your region</u>

- ○ Not at all concerned
- ○ Only a little concerned
- ○ Somewhat concerned
- ○ Very concerned
- ○ Not Sure/ Don't Know

7b. Level of concern about water AVAILABILITY <u>in your region</u>

- ○ Not at all concerned
- ○ Only a little concerned
- ○ Somewhat concerned
- ○ Very concerned
- ○ Not Sure/ Don't Know

7c. Level of concern about water QUALITY in the <u>state as a whole</u>

- ○ Not at all concerned
- ○ Only a little concerned
- ○ Somewhat concerned
- ○ Very concerned
- ○ Not Sure/ Don't Know

7d. Level of concern about water AVAILABILITY in the <u>state as a whole</u>

- ○ Not at all concerned
- ○ Only a little concerned
- ○ Somewhat concerned
- ○ Very concerned
- ○ Not Sure/ Don't Know

8. Please answer the following questions about the most significant threats to water resources, and the LOCATION of the sources of those threats. Please be as specific as you can.

8a. What is the most significant threat to water resources in your region?

8b. Where is the source of this threat located?

8c. What is the most significant threat to water resources in Georgia?

8d. Where is the source of this threat located?

9. Below is a list of sectors and activities that are sometimes mentioned as posing a current or potential threat to water resources in Georgia.

On a scale from 1 to 4, with 1 indicating "no threat", 2 indicating "low level of threat" 3 indicating "moderate threat" and 4 indicating "major threat", please rate the extent to which the activities or sectors listed below pose a threat to water resources in Georgia.

	No threat	Low level of threat	Moderate threat	Major threat	Not Sure
Excessive government regulation	1	2	3	4	9
Droughts or other climatic events	1	2	3	4	9
Water use by agriculture	1	2	3	4	9
Water pollution from agricultural runoff	1	2	3	4	9
Water use by business and industry	1	2	3	4	9
Water pollution by business and industry	1	2	3	4	9
Water use by other states	1	2	3	4	9
Water pollution from other states	1	2	3	4	9
Water use by septic systems	1	2	3	4	9
Water pollution from septic systems	1	2	3	4	9
Water use in urban areas	1	2	3	4	9
Water pollution from urban areas/urbanization	1	2	3	4	9
Water wasted by leaky sewer systems and treatment facilities	1	2	3	4	9
Water pollution from wastewater treatment facilities	1	2	3	4	9
Water use by wildlife	1	2	3	4	9
Water pollution from wildlife	1	2	3	4	9

10. Georgia's water plan is being designed to accommodate a variety of goals. In developing any policy or plan, it is sometimes necessary to prioritize some goals over others.

Please rate the following goals on a scale of 1 to 5 with 1 indicating a goal of the lowest priority and 5 indicating a goal of the highest priority.

	Lowest Priority	2	3	4	Highest Priority
Protect the environment		2	3	4	
Maximize food production	1	2	3	4	5
Foster economic growth	1	2	3	4	5
Protect and enhance recreational opportunities	1	2	3	4	5
Ensure clean drinking water	1	2	3	4	5
Protect Georgia's water resources from other states	1	2	3	4	5
Minimize conflict between water users	1	2	3	4	5

11. Several policy approaches have been discussed and debated at water planning meetings. Please indicate your preferences for the following policy approaches.

11a. Establish and/or enforce property rights

___ unacceptable ____ may be acceptable ____ preferable ____not sure/no opinion

11b. Strengthen regulations and enforcement

___ unacceptable ____ may be acceptable ____ preferable ____not sure/no opinion

11c. Promote voluntary conservation and pollution prevention

___ unacceptable ____ may be acceptable ____ preferable ____not sure/no opinion

11d. Invest in technological solution (e.g. desalination)

___ unacceptable ____ may be acceptable ____ preferable ____not sure/no opinion

11e. Develop market-based approaches (e.g. pollution trading

___ unacceptable ____ may be acceptable ____ preferable ____not sure/no opinion

12. According to several participants in meetings up to this point, defining the boundaries for water planning and management will be one of the most important decisions in the process. In your opinion, what type of boundaries should structure water planning and management in Georgia, and what kind of authority should the regions defined by those boundaries be given? Please be as specific as you can.

13. For this question, assume that regions defined by boundaries will be for PLANNIING purposes only, and will have no authority to make or implement decisions. From the list below, what type of boundaries would you choose?

- ○ Counties or Municipalities
- ○ Regional Development Centers
- ○ Soil and Water Conservation Districts
- ○ Watersheds/River Basins
- ○ State of Georgia
- ○ Other (please specify)________________________

14. For this question, assume that regions defined by boundaries will be given the AUTHORITY TO MAKE AND IMPLEMENT DECISIONS. From the list below, what type of boundaries would you choose?

- ○ Counties or municipalities
- ○ Regional Development Centers
- ○ Soil and Water Conservation Districts
- ○ Watersheds/River Basins
- ○ State of Georgia
- ○ Other (please specify)______________________

15. **Answer this question only if you selected Watersheds/River Basins for one or both of the above questions. What scale or scales should be used to define planning and management boundaries? From smaller to larger, possible watershed scales include: the scale of Georgia's 52 sub-watersheds, the scale of Georgia's 14 major river basins, and the interstate scale of the ACT, ACF and Savannah River Basin.**

15a. Watershed scale, if regions are for PLANNING purposes only

____

15b. Watershed scale, if regions have AUTHORITY to make and implement decisions

____

16. **Please mark the number of hours per week you devote to water resources issues inside and outside of the statewide planning process.**

16a. How many hours per week do you devote to the Georgia water planning process?

☐ Less than 5 ☐ 5 to 10 ☐ 11 to 20 More than 20 ☐

16b. Outside of the water planning process, how many hours per week do you devote to water resource issues?

☐ Less than 5 ☐ 5 to 10 ☐ 11 to 20 More than 20 ☐

17. Below are statements made at one or more water planning meetings. On a scale from 1 to 5, with 1 indicating "strongly agree", 2 indicating "agree", 3 indicating "neither agree nor disagree", 4 indicating "disagree" and 5 indicating "strongly disagree", please indicate your level of agreement or disagreement with each statement.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
If you take water from a basin you should return it	1	2	3	4	5
In-stream flows should mimic natural flows	1	2	3	4	5
We should determine how much water is available in each region, and limit population through planning and zoning to match	1	2	3	4	5
It is acceptable to move water from one basin to another if that will favor economic development and job creation	1	2	3	4	5
The best government is the one that governs the least	1	2	3	4	5
Water resources are finite. There is only so much water to go around	1	2	3	4	5
A first consideration of any good political system is the protection of property rights	1	2	3	4	5
When trade-offs need to be made between economic development and protecting the environment the emphasis should be on protecting the environment	1	2	3	4	5
Decisions about development are best left to the economic market	1	2	3	4	5
The best government is local government	1	2	3	4	5

18. **Please answer the following questions about your level of satisfaction with the process.**

18a. How satisfied are you that the interests of your group or organization will be served by the outcome of the planning process?

- ○ Not at all satisfied
- ○ Somewhat satisfied
- ○ Moderately satisfied
- ○ Highly satisfied

18b. How satisfied are you that the interests of your region will be served by the outcome of the planning process?

- ○ Not at all satisfied
- ○ Somewhat satisfied
- ○ Moderately satisfied
- ○ Highly satisfied

18c. Overall, how satisfied are you with the way the planning process has proceeded?

- ○ Not at all satisfied
- ○ Somewhat satisfied
- ○ Moderately satisfied
- ○ Highly satisfied

19. On a scale from 1 to 4, with 1 indicating "no impact", 2 indicating "very little impact" 3 indicating "some impact" and 4 indicating "great impact," please answer the following questions.

	No Impact	Very Little Impact	Some Impact	Great Impact	Not Sure/No Opinion
How much of an impact do you think the statewide planning process as a whole will have on the final plan?	1	2	3	4	9
How much has your participation in the water planning process impacted your own views about Georgia water resource issues and how to solve them?	1	2	3	4	9

20. This May, we would like to discuss the issues covered by this survey in greater depth with some advisory committee members. If you do not wish to be contact please indicate that here.

____

Thank you very much for taking the time to complete the survey.

Your participation is greatly appreciated.

APPENDIX B

DETAILED SUMMARY STATISTICS

Table B1. Primary Affiliations (using original categories from the survey)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agriculture	10	12.8	12.8	12.8
	Business	17	21.8	21.8	34.6
	Environmental Group	12	15.4	15.4	50.0
	Outdoor Recreation	1	1.3	1.3	51.3
	City or County Government	22	28.2	28.2	79.5
	State Government	1	1.3	1.3	80.8
	University	1	1.3	1.3	82.1
	Water utility	10	12.8	12.8	94.9
	10	4	5.1	5.1	100.0
	Total	78	100.0	100.0	

Table B2. Primary Affiliations (recoded)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agriculture	10	12.8	12.8	12.8
	Business	17	21.8	21.8	34.6
	Environmental Group	12	15.4	15.4	50.0
	Local Government	22	28.2	28.2	78.2
	Water utility	10	12.8	12.8	91.0
	Other	7	9.0	9.0	100.0
	Total	78	100.0	100.0	

Table B3. Secondary Affiliations

	N	Minimum	Maximum	Mean	Std. Deviation
3. Agriculture	78	0	1	.26	.439
3. Business	78	0	1	.50	.503
3. Environment	78	0	1	.45	.501
3. Recreation	78	0	1	.36	.483
3. City/County Government	78	0	1	.46	.502
3. State Government	78	0	1	.05	.222
3. University	78	0	1	.08	.268
3. Water utility	78	0	1	.33	.474
3. Citizen or Property Owner	78	0	1	.45	.501
3 Forestry	78	0	1	.03	.159
Valid N (listwise)	78				

Table B4. Length of Residence in Georgia and in Current Town

	N	Minimum	Maximum	Mean	Std. Deviation
5. Length of Time in GA (years)	78	0	75	39.85	19.227
5. Length of Time in City/Town (years)	77	2	75	28.11	20.493
Valid N (listwise)	77				

Table B5. Number of Years in Residence in Georgia (categorical)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 to 11 years	7	9.0	9.1	9.1
	11 - 25 years	10	12.8	13.0	22.1
	over 25 years	60	76.9	77.9	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B6. Number of Years in Residence in Current Town (categorical)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 to 2 years	3	3.8	3.9	3.9
	2 to 11 years	18	23.1	23.4	27.3
	11 - 25 years	16	20.5	20.8	48.1
	over 25 years	40	51.3	51.9	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B7. Basin Advisory Committee (BAC) Membership

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Savannah	18	23.1	23.1	23.1
	Satilla	6	7.7	7.7	30.8
	Oconee	10	12.8	12.8	43.6
	Flint	10	12.8	12.8	56.4
	Chattahoochee	14	17.9	17.9	74.4
	Coosa	10	12.8	12.8	87.2
	Metro	10	12.8	12.8	100.0
	Total	78	100.0	100.0	

Table B8. Number of BAC Meetings Attended

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3 or less	25	32.1	32.1	32.1
	more than 3	53	67.9	67.9	100.0
	Total	78	100.0	100.0	

Table B9. Spatial Position (Upstream vs. Downstream)

		Frequency	Percent	Valid %	Cumulative %
Valid	upstream metro	7	9.0	9.0	9.0
	upstream non-metro	13	16.7	16.7	25.6
	midstream metro	19	24.4	24.4	50.0
	midstream non-metro	25	32.1	32.1	82.1
	downstream	14	17.9	17.9	100.0
	Total	78	100.0	100.0	

Table B10. Spatial Position (Relative to Fall Line)

		Frequency	Percent	Valid Percent	Cumulative %
Valid	below	27	34.6	34.6	34.6
	above	51	65.4	65.4	100.0
	Total	78	100.0	100.0	

Table B11. Spatial Position (Located in Florida Aquifer)

		Frequency	Percent	Valid Percent	Cumulative %
Valid	not in aquifer	67	85.9	85.9	85.9
	in fl aquifer	11	14.1	14.1	100.0
	Total	78	100.0	100.0	

Table B12. Level of Concern for Water Quality in the Region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all concerned	1	1.3	1.3	1.3
	somewhat concerned	6	7.7	7.7	9.0
	moderately concerned	29	37.2	37.2	46.2
	highly concerned	42	53.8	53.8	100.0
	Total	78	100.0	100.0	

Table B13. Level of Concern for Water Availability in the Region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not at all concerned	2	2.6	2.6	2.6
	somewhat concerned	5	6.4	6.4	9.0
	moderately concerned	14	17.9	17.9	26.9
	highly concerned	57	73.1	73.1	100.0
	Total	78	100.0	100.0	

Table B14. Level of Concern for Water Quality in the State

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	somewhat concerned	5	6.4	6.4	6.4
	moderately concerned	29	37.2	37.2	43.6
	highly concerned	44	56.4	56.4	100.0
	Total	78	100.0	100.0	

Table B15. Level of Concern for Water Availability in the State

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	somewhat concerned	4	5.1	5.1	5.1
	moderately concerned	13	16.7	16.7	21.8
	highly concerned	58	74.4	74.4	96.2
	missing	3	3.8	3.8	100.0
	Total	78	100.0	100.0	

Table B16. Ranking of Threats to Water Resources in Georgia

	N	Minimum	Maximum	Mean	Std. Deviation
9. Excessive Government Regulation	75	1	4	**2.36**	1.111
9. Droughts or Other Climatic Events	78	2	4	**3.45**	.573
9. Water Used by Agriculture	78	1	4	**2.71**	.839
9. Water Pollution by Agriculture	78	1	4	**2.91**	.885
9. Water Used by Business	78	1	4	**2.68**	.875
9. Water Pollution by Business	78	1	4	**2.88**	.821
9. Water Used by Other States	75	1	4	**3.01**	.862
9. Water Pollution by Other States	72	1	4	**2.32**	.819
9. Water Used by Septic Systems	77	1	4	**2.61**	.920
9. Water Pollution From Septic Systems	75	1	4	**2.79**	.874
9. Water Used by Urban Areas	77	1	4	**3.43**	.751
9. Water Pollution From Urban Areas	78	1	4	**3.50**	.752
9. Waste by Wastewater Treatment	77	1	4	**2.83**	.801
9. Pollution by Wastewater Treatment	77	1	4	**2.44**	.866
9. Water Used by Wildlife	77	1	4	**1.40**	.591
9. Water Pollution by Wildlife	78	1	4	**1.78**	.816
Valid N (listwise)	64				

Table B17. Prioritization of Goals for Water Planning (Goal Equals Foster Economic Growth)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lowest priority	8	10.3	10.4	10.4
	Second lowest priority	6	7.7	7.8	18.2
	Medium priority	25	32.1	32.5	50.6
	Second highest priority	30	38.5	39.0	89.6
	Highest priority	8	10.3	10.4	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B18. Prioritization of Goals for Water Planning (Goal Equals Ensure Clean Drinking Water)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Second lowest priority	1	1.3	1.3	1.3
	Medium priority	5	6.4	6.5	7.8
	Second highest priority	10	12.8	13.0	20.8
	Highest priority	61	78.2	79.2	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B19. Prioritization of Goals for Water Planning (Goal Equals Minimize Conflict Between Water Users)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lowest priority	6	7.7	7.8	7.8
	Second lowest priority	8	10.3	10.4	18.2
	Medium priority	32	41.0	41.6	59.7
	Second highest priority	19	24.4	24.7	84.4
	Highest priority	12	15.4	15.6	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B20. Prioritization of Goals for Water Planning (Goal Equals Protect the Environment)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Second lowest priority	3	3.8	3.9	3.9
	Medium priority	17	21.8	22.1	26.0
	Second highest priority	22	28.2	28.6	54.5
	Highest priority	35	44.9	45.5	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B21. Prioritization of Goals for Water Planning (Goal Equals Protect Recreational Opportunities)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lowest priority	4	5.1	5.2	5.2
	Second lowest priority	20	25.6	26.0	31.2
	Medium priority	30	38.5	39.0	70.1
	Second highest priority	20	25.6	26.0	96.1
	Highest priority	3	3.8	3.9	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B22. Prioritization of Goals for Water Planning (Goal Equals Maximize Food Production)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lowest priority	2	2.6	2.6	2.6
	Second lowest priority	14	17.9	18.2	20.8
	Medium priority	29	37.2	37.7	58.4
	Second highest priority	20	25.6	26.0	84.4
	Highest priority	12	15.4	15.6	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B23. Prioritization of Goals for Water Planning (Goal Equals Protect Georgia's Water Resources from Other States)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lowest priority	3	3.8	3.9	3.9
	Second lowest priority	19	24.4	24.7	28.6
	Medium priority	18	23.1	23.4	51.9
	Second highest priority	21	26.9	27.3	79.2
	Highest priority	16	20.5	20.8	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B24. Favorability of Strategies for Water Planning (Develop Market-based Approaches)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unacceptable	22	28.2	30.6	30.6
	May be acceptable	35	44.9	48.6	79.2
	Preferable	15	19.2	20.8	100.0
	Total	72	92.3	100.0	
Missing	System	6	7.7		
Total		78	100.0		

Table B25. Favorability of Strategies for Water Planning (Invest in Technological Solutions)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unacceptable	7	9.0	9.5	9.5
	May be acceptable	32	41.0	43.2	52.7
	Preferable	35	44.9	47.3	100.0
	Total	74	94.9	100.0	
Missing	System	4	5.1		
Total		78	100.0		

Table B26. Favorability of Strategies for Water Planning (Promote Voluntary Conservation and Pollution Prevention)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unacceptable	6	7.7	7.8	7.8
	May be acceptable	24	30.8	31.2	39.0
	Preferable	47	60.3	61.0	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B27. Favorability of Strategies for Water Planning (Strengthen Regulations and Enforcement)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unacceptable	5	6.4	6.5	6.5
	May be acceptable	38	48.7	49.4	55.8
	Preferable	34	43.6	44.2	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B28. Favorability of Strategies for Water Planning (Establish and/or Enforce Property Rights)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unacceptable	9	11.5	13.0	13.0
	May be acceptable	32	41.0	46.4	59.4
	Preferable	28	35.9	40.6	100.0
	Total	69	88.5	100.0	
Missing	System	9	11.5		
Total		78	100.0		

Table B29. Assumptions/ Principles about the Nature of Water and Water Planning (Water Resources are Finite)

		Frequency	Percent	Valid %	Cumulative %
Valid	Strongly agree	39	50.0	50.6	50.6
	Agree	28	35.9	36.4	87.0
	Neither agree nor disagree	4	5.1	5.2	92.2
	Disagree	3	3.8	3.9	96.1
	Strongly disagree	3	3.8	3.9	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B30. Assumptions/ Principles about the Nature of Water and Water Planning (In-stream Flows Should Mimic Natural Flows)

		Frequency	Percent	Valid %	Cumulative %
Valid	Strongly agree	15	19.2	19.5	19.5
	Agree	28	35.9	36.4	55.8
	Neither agree nor disagree	13	16.7	16.9	72.7
	Disagree	17	21.8	22.1	94.8
	Strongly disagree	4	5.1	5.2	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B31. Assumptions/ Principles about the Nature of Water and Water Planning (If You Take Water from a Basin You Should Return It)

		Frequency	Percent	Valid %	Cumulative %
Valid	Strongly agree	18	23.1	23.4	23.4
	Agree	28	35.9	36.4	59.7
	Neither agree nor disagree	17	21.8	22.1	81.8
	Disagree	12	15.4	15.6	97.4
	Strongly disagree	2	2.6	2.6	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B32. Assumptions/ Principles about the Nature of Water and Water Planning (It is Acceptable to Move Water for Economic Development)

		Frequency	Percent	Valid %	Cumulative%
Valid	Strongly agree	7	9.0	9.1	9.1
	Agree	26	33.3	33.8	42.9
	Neither agree nor disagree	12	15.4	15.6	58.4
	Disagree	15	19.2	19.5	77.9
	Strongly disagree	17	21.8	22.1	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B33. Assumptions/ Principles about the Nature of Water and Water Planning (Limit Population Through Planning and Zoning)

		Frequency	Percent	Valid %	Cumulative %
Valid	Strongly agree	12	15.4	15.6	15.6
	Agree	26	33.3	33.8	49.4
	Neither agree nor disagree	11	14.1	14.3	63.6
	Disagree	20	25.6	26.0	89.6
	Strongly disagree	8	10.3	10.4	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B34. Basic Attitudes/ Values: Politics, Economics, and the Environment (The Best Government is the One that Governs the Least)

		Frequency	Percent	Valid %	Cumulative %
Valid	Strongly agree	14	17.9	18.2	18.2
	Agree	17	21.8	22.1	40.3
	Neither agree nor disagree	20	25.6	26.0	66.2
	Disagree	20	25.6	26.0	92.2
	Strongly disagree	6	7.7	7.8	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B35. Basic Attitudes/ Values: Politics, Economics, and the Environment (Any Good Political System will First Protect Property Rights)

		Frequency	Percent	Valid %	Cumulative %
Valid	Strongly agree	15	19.2	19.5	19.5
	Agree	26	33.3	33.8	53.2
	Neither agree nor disagree	21	26.9	27.3	80.5
	Disagree	9	11.5	11.7	92.2
	Strongly disagree	6	7.7	7.8	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B36. Basic Attitudes/ Values: Politics, Economics, and the Environment (Tradeoffs between Economic Development and Environment should Favor the Environment)

		Frequency	Percent	Valid %	Cumulative %
Valid	Strongly agree	16	20.5	20.8	20.8
	Agree	23	29.5	29.9	50.6
	Neither agree nor disagree	28	35.9	36.4	87.0
	Disagree	8	10.3	10.4	97.4
	Strongly disagree	2	2.6	2.6	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B37. Basic Attitudes/ Values: Politics, Economics, and the Environment (The Best Government is Local Government)

		Frequency	Percent	Valid %	Cumulative %
Valid	Strongly agree	13	16.7	16.9	16.9
	Agree	22	28.2	28.6	45.5
	Neither agree nor disagree	16	20.5	20.8	66.2
	Disagree	20	25.6	26.0	92.2
	Strongly disagree	6	7.7	7.8	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B38. Basic Attitudes/ Values: Politics, Economics, and the Environment (Decisions about Development are Best Left to the Economic Market)

		Frequency	Percent	Valid %	Cumulative %
Valid	Strongly agree	3	3.8	3.9	3.9
	Agree	13	16.7	16.9	20.8
	Neither agree nor disagree	13	16.7	16.9	37.7
	Disagree	33	42.3	42.9	80.5
	Strongly disagree	15	19.2	19.5	100.0
	Total	77	98.7	100.0	
Missing	System	1	1.3		
Total		78	100.0		

Table B39. Managerial Problem Boundaries Planning Scale (Original Categories from Survey)

Planning Scale		Frequency	Percent
Valid	1 Counties	5	6.5
	2 RDCs	4	5.2
	3 SWCDs	6	7.8
	4 Watersheds	55	71.4
	5 State of GA	7	9.1
	Total	77	100.0

Table B40. Managerial Problem Boundaries Planning Scale (Recoded Categories)

Planning Scale Binary		Frequency	Percent
Valid	0 Political/Economic	22	28.6
	1 Water-based	55	71.4
	Total	77	100.0

Table B41. Managerial Problem Boundaries Planning Scale (Recoded Ordinal Categories)

Planning Scale Ordinal		Frequency	Percent
Valid	1 Counties	5	6.5
	2 Small watersheds	15	19.5
	3 SWCDs	6	7.8
	4 RDCs	4	5.2
	5 GA's 14 basins	29	37.7
	6 State of GA	7	9.1
	7 Interstate basins	4	5.2
	Total	70	90.9
Missing	System	7	9.1
Total		77	100.0

Table B42. Managerial Problem Boundaries Authority Scale (Original Categories from Survey)

Authority Scale		Frequency	Percent
Valid	1 Counties	8	10.4
	2 RDCs	4	5.2
	3 SWCDs	2	2.6
	4 Watersheds	40	51.9
	5 State of GA	23	29.9
	Total	77	100.0

Table B43. Managerial Problem Boundaries Authority Scale (Recoded Categories)

Authority Scale Binary		Frequency	Percent
Valid	0 Political/Economic	37	48.1
	1 Water-based	40	51.9
	Total	77	100.0

Table B43. Managerial Problem Boundaries Authority Scale (Recoded Ordinal Categories)

Authority Scale Ordinal		Frequency	Percent
Valid	1 Counties	8	10.4
	2 Small watersheds	7	9.1
	3 SWCDs	2	2.6
	4 RDCs	4	5.2
	5 GA's 14 basins	29	37.7
	6 State of GA	23	29.9
	7 Interstate basins	1	1.3
	Total	74	96.1
Missing	System	3	3.9
Total		77	100.0

APPENDIX C

CORRELATION MATRIX

Table C1. Correlation of Independent Variables.

Correlations

		RUR_URB	P_AFF	UP_DOWN	ZPRO_CON
RUR_URB	Pearson Correlation	1	-.020	-.099	-.129
	Sig. (2-tailed)	.	.866	.394	.267
	N	76	76	76	76
P_AFF	Pearson Correlation	-.020	1	-.059	-.097
	Sig. (2-tailed)	.866	.	.609	.399
	N	76	77	77	77
UP_DOWN	Pearson Correlation	-.099	-.059	1	-.169
	Sig. (2-tailed)	.394	.609	.	.141
	N	76	77	77	77
ZPRO_CON	Pearson Correlation	-.129	-.097	-.169	1
	Sig. (2-tailed)	.267	.399	.141	.
	N	76	77	77	77

APPENDIX D

CREATING CONCEPTUAL PROBLEM BOUNDING CLUSTERS

The first step in the creation of the conceptual bounding variables was to transform the likert scale responses for the conceptual bounding elements – threats, goals, strategies, and assumptions about water/water planning - into binary variables. The intention in doing this was to make a clear distinction between which threats, etc. were seen as significant in respondents' problem bounding. Thus, I assigned a "1" to problem drivers identified as "moderate" or "major", goals assigned as one of the top two priorities, strategies identified as "favorable", and statements relating to metaphors either "agreed" with or "strongly agreed" with. These new binary variables allow for an analysis that looks at the gross level of "did the respondent think the threat (or goal, strategy, principle) was relevant" or didn't they. A score of one on the binary is presumed to indicate that that problem element is significant for an individual in their problem definition – i.e. they engaged in conceptual problem bounding in a way that included this element.

By examining the descriptive statistics, I saw that there were three problem drivers and one goal that either mostly everyone or mostly no one included in their conceptual bounding of the problem. Both the threats to water due to drought and urbanization, and the goal of insuring clean water, had a mean score (on a 0 to 1 binary scale) greater than .85. Thus, the threats of drought and urbanization can be considered a part of almost all respondents conceptual bounding of water problems in Georgia, as can a goal for intervention of "insuring clean water". Likewise, although I did hear a lot of people talking about the threat of wildlife for Georgia's water, threat of wildlife *use* of water did not turn out to play a significant role in respondent's conceptual bounding of the problem – the mean score on the binary variable was below .15. Thus, these threats and goal were excluded from the cluster analysis to determine conceptual bounding clusters 1 and 2. Although it is important to keep in mind that the threats of urbanization and drought are significant for the clear majority of survey respondents, as is the goal of insuring clean water for all Georgians, these items have little to teach us about the distinct ways that different stakeholders conceptually bound Georgia's water problems.

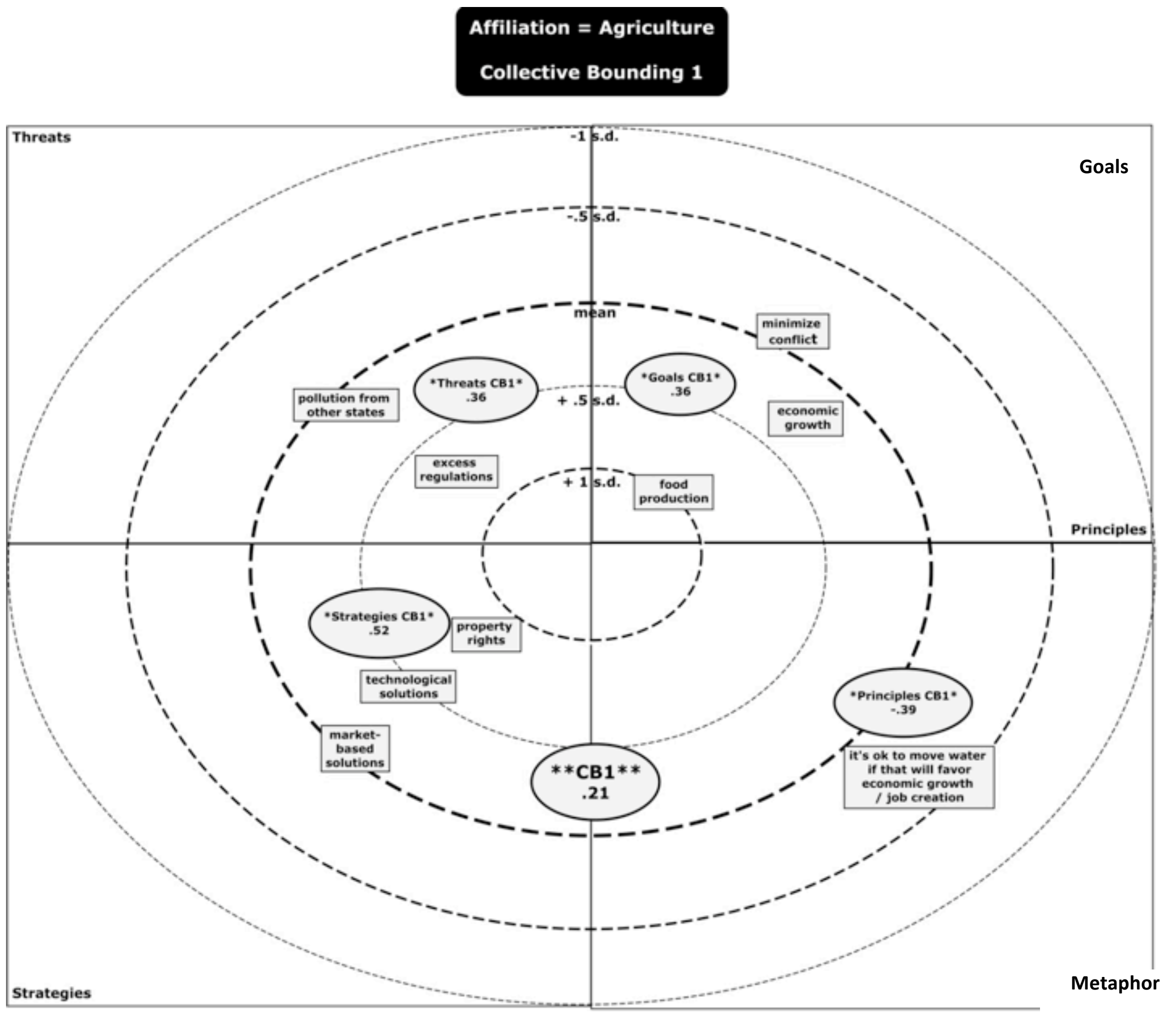
The next step was to run a cluster analysis on the remaining variables (see Appendix E for details). Once this had been completed, I looked at the correlations between the elements classified into cluster 1 and cluster 2 (see Appendix F). Generally, there were multiple correlations between the elements, but a few items, in particular, threats = wildlife pollution and goal=recreational opportunities had very few correlations with other elements. I therefore removed these elements from the clusters.

At this point I had two clusters that were groupings of problem drivers, goals, strategies, and metaphor statements, which was useful to flesh out the narrative structure of the conceptual bounding clusters. To be able to use them in analysis, I needed to be able to create variables using the representations that were made through cluster analysis. This was a three-part process: 1) standardizing the variables so I could compare across problem drivers, goals, etc., all of which were queried with differently formulated likert scales; 2) creating mean scores for the four quadrants of the conceptual bounding framework; 3) combining the four quadrants to create a mean overall score for CB1 and CB2.

Before standardization, I first imputed missing values. Except for respondent #28, who I dropped from the analysis because of so many missing values, there were very few missing values. I imputed the missing values by replacing them with the series mean. Subsequently, I standardized all values by computing z-scores for all the questions relating to the conceptual bounding elements - threats, goals, etc. This allowed for comparison between conceptual bounding elements measured according to different scales. Next, I created a set of variables named Threats1, Goals1, etc. and Threats2, Goals2, etc. Threats1 is the mean score of a respondent for all the threats corresponding to the Threat quadrant in conceptual bounding cluster 1. Threats2 is the mean score of a respondent for all the threats corresponding to the Threat quadrant in conceptual bounding cluster 2. Finally, I computed the mean of Threats1 + Goals1+ Strategies1 + Metaphors 1 (and did the same for the elements of CB2). These means of standardized scores for all the elements determined by cluster analysis to belong to one of the two conceptual bounding clusters are CB1 and CB2. Each stakeholder in the survey has a CB1 and a CB2 score, and all the other components that make up CB1 and CB2 (Threats1, Threats2, etc.)

In Figure D1 below, this method can be perhaps better understood through visualization. The rectangular components on the diagram are the specific threats, goals, strategies, and metaphors, in this case that together make up CB1. The grey-shaded oval elements are mean scores in each quadrant, and correspond to Threats1, Goals1, etc. The grey shaded oval with two stars is the "mean of the means" and, in the case of this diagram, is the mean score for all stakeholders with an agricultural affiliation with respect to Conceptual Bounding Cluster 1. The diagram is useful in that it shows how close an individual, or in this case a group, is to the Conceptual Bounding Cluster, and also gives information as to how they differ from the idealized model. In the case of agricultural affiliation, the diagram shows a strong association with CB1, but it also shows that agricultural affiliates were not so keen on the element of CB1 that relates to moving water to foster economic growth.

Figure D1. Example of CB1 for Agriculture



APPENDIX E

CLUSTER ANALYSIS RESULTS

Table E1. Cluster Analysis

Agglomeration Schedule

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	3	14	14.000	0	0	3
2	4	5	17.000	0	0	11
3	2	3	18.000	0	1	16
4	12	26	19.000	0	0	21
5	1	22	19.000	0	0	14
6	9	10	21.000	0	0	23
7	6	27	22.000	0	0	20
8	21	25	24.000	0	0	18
9	18	19	24.000	0	0	14
10	11	15	24.000	0	0	22
11	4	24	24.500	2	0	18
12	8	23	25.000	0	0	16
13	17	20	26.000	0	0	20
14	1	18	27.000	5	9	17
15	7	13	27.000	0	0	22
16	2	8	27.167	3	12	19
17	1	16	27.750	14	0	21
18	4	21	28.333	11	8	19
19	2	4	29.280	16	18	23
20	6	17	31.000	7	13	24
21	1	12	31.300	17	4	25
22	7	11	31.500	15	10	25
23	2	9	34.200	19	6	24
24	2	6	35.917	23	20	26
25	1	7	36.393	21	22	26
26	1	2	42.494	25	24	0

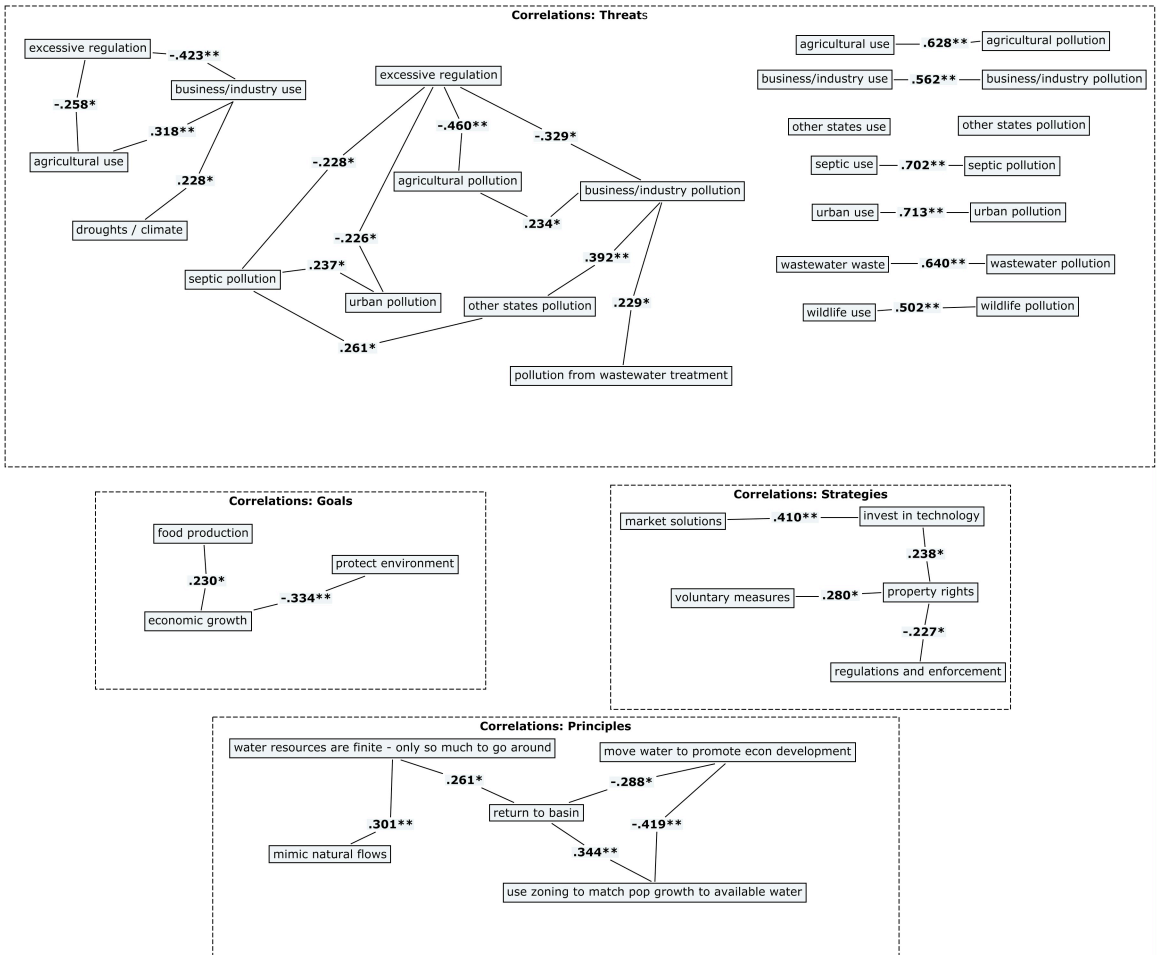
Cluster Membership

Case	4 Clusters	3 Clusters	2 Clusters
threat = excessive regulation	1	1	**1**
threat = ag use	2	2	**2**
threat = ag pollution	2	2	**2**
threat = business/industry use	2	2	**2**
threat = business/industry pollution	2	2	**2**
threat = other states use	3	2	**2**
threat = other states pollution	4	3	**1**
threat = septic pollution	2	2	**2**
threat = waste (use) by treatment facilities	2	2	**2**
threat = pollution from wastewater	2	2	**2**
threat = wildlife pollution	4	3	**1**
goal = economic growth	1	1	**1**
goal = minimize conflict	4	3	**1**
goal = protect environment	2	2	**2**
goal = recreational opportunities	4	3	**1**
goal = food production	1	1	**1**
goal = protect GA's water	3	2	**2**
policy approach = market solutions	1	1	**1**
policy approach = invest in technology	1	1	**1**
policy approach = voluntary measures	3	2	**2**
policy approach = regulations and enforcement	2	2	**2**
policy approach = property rights	1	1	**1**
water policy = return to basin	2	2	**2**
water policy = mimic natural flows	2	2	**2**
water policy = use zoning to guide population to available water	2	2	**2**
water policy = move water to promote economic development	1	1	**1**
water policy = finite resources	3	2	**2**

APPENDIX F

CORRELATION ANALYSIS OF CLUSTERS

Figure F1. Correlations of Threats, Goals, Strategies and Principles



Correlations: Cluster 1

	excess regs	oth states poll	Wild-life poll	econ growth	conflict min	rec opps	food prod	market	Tech-nology	property rights	move water
threat = excessive regulation	1.000	-.194	.054	.461(**)	-.134	.043	.221	.332(**)	.314(**)	.480(**)	.306(**)
threat = other states pollution	-.194	1.000	.045	-.265(*)	.254(*)	-.046	-.101	-.074	-.155	-.197	-.230(*)
threat = wildlife pollution	.054	.045	1.000	.041	.125	.160	.112	-.047	-.063	-.052	.100
goal = economic growth	.461(**)	-.265(*)	.041	1.000	-.069	.150	.222	.105	.247(*)	.172	.510(**)
goal = minimize conflict	-.134	.254(*)	.125	-.069	1.000	.101	.060	-.003	-.005	.040	-.015
goal = recreational opportunities	.043	-.046	.160	.150	.101	1.000	.083	-.106	.145	-.021	.008
goal = food production	.221	-.101	.112	.222	.060	.083	1.000	.184	.289(*)	.294(**)	.068
policy approach = market solutions	.332(**)	-.074	-.047	.105	-.003	-.106	.184	1.000	.407(**)	.105	.170
policy approach = invest in technology	.314(**)	-.155	-.063	.247(*)	-.005	.145	.289(*)	.407(**)	1.000	.232(*)	-.053
policy approach = property rights	.480(**)	-.197	-.052	.172	.040	-.021	.294(**)	.105	.232(*)	1.000	.055
water policy = move water to promote economic development	.306(**)	-.230(*)	.100	.510(**)	-.015	.008	.068	.170	-.053	.055	1.000

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Correlations: Cluster 2

	ag use	ag poll	bus use	bus poll	oth states use	septic poll	waste by facilities	poll from treatment	zoning	finite
threat = ag use	1.000	.627(**)	.312(**)	.215	.067	.299(**)	.141	-.015	.147	.066
ag pollution	.627(**)	1.000	.362(**)	.229(*)	.053	.210	-.010	-.097	.160	.074
business/industry use	.312(**)	.362(**)	1.000	.550(**)	-.027	.255(*)	.163	.136	.145	.357(**)
business/industry pollution	.215	.229(*)	.550(**)	1.000	.182	.094	.137	.240(*)	.338(**)	.258(*)
other states use	.067	.053	-.027	.182	1.000	.049	.074	.174	.156	.296(**)
septic pollution	.299(**)	.210	.255(*)	.094	.049	1.000	.060	.100	.203	.167
waste by treatment facilities	.141	-.010	.163	.137	.074	.060	1.000	.565(**)	.077	.086
pollution from treatment	-.015	-.097	.136	.240(*)	.174	.100	.565(**)	1.000	.142	.100
goal = protect environment	.402(**)	.561(**)	.308(**)	.151	.078	.316(**)	.066	-.026	.348(**)	.124
protect GA's water	-.138	-.138	-.087	.050	.302(**)	.022	-.111	-.045	.090	.217
strategy = voluntary measures	-.241(*)	-.078	-.228(*)	-.181	.049	.017	-.230(*)	.046	-.117	.167
regulations and enforcement	.219	.316(**)	.369(**)	.421(**)	.027	.120	.009	.075	.378(**)	.188
principle = return to basin	.114	.248(*)	.337(**)	.346(**)	.030	.322(**)	.159	.176	.334(**)	.234(*)
mimic natural flows	.099	.136	.315(**)	.388(**)	.084	.255(*)	.105	.242(*)	.145	.279(*)
use zoning to guide pop to available water	.147	.160	.145	.338(**)	.156	.203	.077	.142	1.000	.072
finite resources	.066	.074	.357(**)	.258(*)	.296(**)	.167	.086	.100	.072	1.000

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Correlations: Cluster 2, Continued

	protect environ	protect GA's water	volunt	regs	return	mimic
threat = ag use	.402(**)	-.138	-.241(*)	.219	.114	.099
ag pollution	.561(**)	-.138	-.078	.316(**)	.248(*)	.136
business/industry use	.308(**)	-.087	-.228(*)	.369(**)	.337(**)	.315(**)
business/industry pollution	.151	.050	-.181	.421(**)	.346(**)	.388(**)
other states use	.078	.302(**)	.049	.027	.030	.084
septic pollution	.316(**)	.022	.017	.120	.322(**)	.255(*)
waste by treatment facilities	.066	-.111	-.230(*)	.009	.159	.105
pollution from treatment	-.026	-.045	.046	.075	.176	.242(*)
goal = protect environment	1.000	-.082	-.048	.407(**)	.299(**)	.010
protect GA's water	-.082	1.000	.342(**)	-.018	-.059	.018
strategy = voluntary measures	-.048	.342(**)	1.000	-.201	-.059	.201
regulations and enforcement	.407(**)	-.018	-.201	1.000	.303(**)	.264(*)
principle = return to basin	.299(**)	-.059	-.059	.303(**)	1.000	.177
mimic natural flows	.010	.018	.201	.264(*)	.177	1.000
use zoning to guide pop to available water	.348(**)	.090	-.117	.378(**)	.334(**)	.145
finite resources	.124	.217	.167	.188	.234(*)	.279(*)

APPENDIX G

COMPARISON OF MEANS FOR CONCEPTUAL PROBLEM BOUNDING

Table G1. CB1 and CB2 Difference in Means Test for Agriculture Affiliation

Group Statistics

	AG	N	Mean	Std. Deviation	Std. Error Mean
CB1	.00	63	-.0470	.49051	.06180
	1.00	14	.2117	.45982	.12289
CB2	.00	63	.0494	.41522	.05231
	1.00	14	-.2224	.54898	.14672

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
CB1	Equal variances assumed	.025	.875	-1.804	75	.075	-.2587	.14340	-.54439	.02693
	Equal variances not assumed			-1.881	20.136	.075	-.2587	.13755	-.54554	.02808
CB2	Equal variances assumed	.953	.332	2.085	75	.041	.2718	.13040	.01206	.53159
	Equal variances not assumed			1.745	16.460	.100	.2718	.15577	-.05764	.60129

Table G2. CB1 and CB2 Difference in Means Test for Business Affiliation

Group Statistics

	BUS	N	Mean	Std. Deviation	Std. Error Mean
CB1	.00	61	-.0336	.52120	.06673
	1.00	16	.1281	.34662	.08666
CB2	.00	61	.0143	.46059	.05897
	1.00	16	-.0544	.42153	.10538

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
CB1	Equal variances assumed	2.724	.103	-1.172	75	.245	-.1617	.13799	-.43655	.11322
	Equal variances not assumed			-1.478	34.990	.148	-.1617	.10937	-.38371	.06037
CB2	Equal variances assumed	.495	.484	.540	75	.591	.0687	.12725	-.18481	.32219
	Equal variances not assumed			.569	25.247	.575	.0687	.12076	-.17990	.31728

Table G3. CB1 and CB2 Difference in Means Test for Environmental Affiliation

Group Statistics

	ENV	N	Mean	Std. Deviation	Std. Error Mean
CB1	.00	63	.1169	.41267	.05199
	1.00	14	-.5260	.49141	.13133
CB2	.00	63	-.0605	.44775	.05641
	1.00	14	.2722	.36756	.09823

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
CB1	Equal variances assumed	.395	.532	5.092	75	.000	.6429	.12627	.39137	.89446
	Equal variances not assumed			4.552	17.305	.000	.6429	.14125	.34530	.94053
CB2	Equal variances assumed	2.453	.122	-2.589	75	.012	-.3327	.12850	-.58869	-.07671
	Equal variances not assumed			-2.937	22.475	.008	-.3327	.11328	-.56734	-.09806

Table G4. CB1 and CB2 Difference in Means Test for Government Affiliation

Group Statistics

	GOV	N	Mean	Std. Deviation	Std. Error Mean
CB1	.00	54	-.0184	.51092	.06953
	1.00	23	.0433	.45405	.09468
CB2	.00	54	.0035	.47514	.06466
	1.00	23	-.0081	.39810	.08301

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
CB1	Equal variances assumed	.547	.462	-.501	75	.618	-.0617	.12323	-.30723	.18375
	Equal variances not assumed			-.526	46.513	.602	-.0617	.11746	-.29811	.17463
CB2	Equal variances assumed	.930	.338	.103	75	.919	.0116	.11302	-.21355	.23673
	Equal variances not assumed			.110	49.266	.913	.0116	.10522	-.19983	.22300

Table G5. CB1 and CB2 Difference in Means Test for Water Affiliation

Group Statistics

	WAT	N	Mean	Std. Deviation	Std. Error Mean
CB1	.00	67	-.0202	.50759	.06201
	1.00	10	.1356	.36759	.11624
CB2	.00	67	-.0054	.45399	.05546
	1.00	10	.0360	.45165	.14282

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
CB1	Equal variances assumed	1.859	.177	-.932	75	.354	-.1558	.16710	-.48867	.17707
	Equal variances not assumed			-1.183	14.689	.256	-.1558	.13175	-.43713	.12554
CB2	Equal variances assumed	.050	.824	-.269	75	.789	-.0414	.15381	-.34780	.26501
	Equal variances not assumed			-.270	11.882	.792	-.0414	.15322	-.37560	.29280

Table G6. CB1 and CB2 Difference in Means Test for Rural

Group Statistics

	RURAL	N	Mean	Std. Deviation	Std. Error Mean
CB1	.00	47	-.0719	.52337	.07634
	1.00	29	.1136	.43128	.08009
CB2	.00	47	.0025	.41427	.06043
	1.00	29	-.0057	.51946	.09646

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
CB1	Equal variances assumed	1.270	.263	-1.602	74	.114	-.1855	.11584	-.41633	.04530
	Equal variances not assumed			-1.677	67.886	.098	-.1855	.11064	-.40631	.03527
CB2	Equal variances assumed	2.182	.144	.077	74	.939	.0083	.10790	-.20670	.22328
	Equal variances not assumed			.073	49.635	.942	.0083	.11383	-.22038	.23696

Table G7. CB1 and CB2 Difference in Means Test for Upstream

Group Statistics

	UPSTREAM	N	Mean	Std. Deviation	Std. Error Mean
CB1	.00	57	-.0793	.50039	.06628
	1.00	20	.2261	.39932	.08929
CB2	.00	57	-.0321	.47593	.06304
	1.00	20	.0915	.36582	.08180

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
CB1	Equal variances assumed	.989	.323	-2.464	75	.016	-.3054	.12392	-.55223	-.05851
	Equal variances not assumed			-2.746	41.438	.009	-.3054	.11120	-.52987	-.08087
CB2	Equal variances assumed	2.496	.118	-1.056	75	.294	-.1237	.11710	-.35694	.10963
	Equal variances not assumed			-1.197	43.111	.238	-.1237	.10327	-.33190	.08460

Table G3. CB1 and CB2 Difference in Means Test for Values (Values measured on Standardized Scale)

Group Statistics

	ZPRO_CON	N	Mean	Std. Deviation	Std. Error Mean
CB1	>= .00000	39	.2008	.39264	.06287
	< .00000	38	-.2061	.50367	.08171
CB2	>= .00000	39	-.1507	.43213	.06920
	< .00000	38	.1547	.42117	.06832

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
CB1	Equal variances assumed	2.733	.102	3.960	75	.000	.4070	.10277	.20225	.61169
	Equal variances not assumed			3.947	69.920	.000	.4070	.10310	.20135	.61259
CB2	Equal variances assumed	.010	.919	-3.139	75	.002	-.3054	.09727	-.49915	-.11158
	Equal variances not assumed			-3.140	75.000	.002	-.3054	.09724	-.49908	-.11165

APPENDIX H

COMPARISON OF MEANS FOR MANAGERIAL PROBLEM BOUNDING

Table H1. Comparison of Means for Managerial Problem Bounding (Primary Affiliation is Agriculture)

Group Statistics

	PAFF_AG	N	Mean	Std. Deviation	Std. Error Mean
Planning Binary	1.00	10	.60	.516	.163
	.00	67	.73	.447	.055
Authority Binary	1.00	10	.40	.516	.163
	.00	67	.54	.502	.061
Planning Ordinal	1.00	8	3.63	1.506	.532
	.00	62	4.11	1.747	.222
Authority Ordinal	1.00	9	4.78	1.202	.401
	.00	65	4.48	1.769	.219
Planning: Political	1.00	4	2.25	.500	.250
	.00	18	2.06	.802	.189
Authority: Political	1.00	6	2.50	.548	.224
	.00	31	2.39	.882	.158
Planning: Watershed	1.00	4	1.50	.577	.289
	.00	44	1.80	.594	.090
Authority: Watershed	1.00	3	2.00	.000	.000
	.00	34	1.82	.459	.079

Table H1(continued)

Independent Samples Test

Agricultural Affiliation compared to all other Affiliations		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Planning Binary	Equal var assumed	1.697	.197	-.850	75	.398	-.13	.154	-.439	.176
	not assumed			-.763	11.103	.461	-.13	.172	-.510	.247
Authority Binary	Equal var assumed	1.025	.315	-.804	75	.424	-.14	.171	-.478	.203
	not assumed			-.787	11.690	.447	-.14	.174	-.519	.244
Planning Ordinal	Equal var assumed	.533	.468	-.753	68	.454	-.49	.648	-1.780	.804
	not assumed			-.846	9.609	.418	-.49	.577	-1.780	.804
Authority Ordinal	Equal var assumed	1.802	.184	.493	72	.623	.30	.610	-.915	1.517
	not assumed			.659	13.367	.521	.30	.457	-.683	1.285
Planning: Political	Equal var assumed	1.062	.315	.460	20	.650	.19	.423	-.687	1.076
	not assumed			.620	7.011	.555	.19	.313	-.547	.935
Authority: Political	Equal var assumed	3.752	.061	.300	35	.766	.11	.376	-.650	.876
	not assumed			.412	10.829	.688	.11	.274	-.491	.717
Planning: Watershed	Equal var assumed	.028	.868	-.955	46	.345	-.30	.310	-.918	.328
	not assumed			-.978	3.602	.389	-.30	.302	-1.172	.582
Authority: Watershed	Equal var assumed	3.660	.064	.658	35	.515	.18	.268	-.368	.721
	not assumed			2.244	33.000	.032	.18	.079	.016	.336

Table H2. Comparison of Means for Managerial Problem Bounding (Primary Affiliation is Business)

Group Statistics

	PAFF_BUS	N	Mean	Std. Deviation	Std. Error Mean
Planning Binary	1.00	16	.56	.512	.128
	.00	61	.75	.434	.056
Authority Binary	1.00	16	.50	.516	.129
	.00	61	.52	.504	.064
Planning Ordinal	1.00	16	4.44	1.861	.465
	.00	54	3.94	1.676	.228
Authority Ordinal	1.00	16	5.00	1.549	.387
	.00	58	4.38	1.735	.228
Planning: Political	1.00	7	2.00	.816	.309
	.00	15	2.13	.743	.192
Authority: Political	1.00	8	2.63	.744	.263
	.00	29	2.34	.857	.159
Planning: Watershed	**1.00**	**9**	**2.11**	**.601**	**.200**
	.00	**39**	**1.69**	**.569**	**.091**
Authority: Watershed	1.00	8	2.00	.535	.189
	.00	29	1.79	.412	.077

Table H2 (continued)

Business Affiliation compared to all other Affiliations		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Planning Binary	Equal var assumed	4.691	.034	-1.513	75	.135	-.19	.127	-.444	.061
	not assumed			-1.372	20.997	.184	-.19	.140	-.482	.099
Authority Binary	Equal var assumed	.038	.846	-.173	75	.863	-.02	.142	-.308	.259
	not assumed			-.170	23.056	.866	-.02	.144	-.323	.274
Planning Ordinal	Equal var assumed	.063	.803	1.008	68	.317	.49	.489	-.483	1.469
	not assumed			.952	22.704	.351	.49	.518	-.579	1.566
Authority Ordinal	Equal var assumed	2.488	.119	1.294	72	.200	.62	.480	-.335	1.577
	not assumed			1.381	26.351	.179	.62	.449	-.302	1.544
Planning: Political	Equal var assumed	.001	.977	-.380	20	.708	-.13	.351	-.865	.598
	not assumed			-.367	10.842	.721	-.13	.363	-.935	.668
Authority: Political	Equal var assumed	1.940	.173	.840	35	.407	.28	.334	-.397	.957
	not assumed			.911	12.635	.379	.28	.307	-.386	.946
Planning: Watershed	Equal var assumed	.842	.364	1.970	46	**.055***	**.42**	.213	-.009	.847
	not assumed			1.903	11.550	.082	.42	.220	-.063	.900
Authority: Watershed	Equal var assumed	.428	.517	1.179	35	.246	.21	.175	-.149	.563
	not assumed			1.015	9.422	.336	.21	.204	-.251	.665

Among those who chose watersheds for defining planning boundaries, the mean scale selection for the 9 individuals affiliated with a business group was .42 (on a scale of 1 to 3) larger than the mean score for the 39 individuals with different affiliations.

Table H3. Comparison of Means for Managerial Problem Bounding (Primary Affiliation is Environment)

Group Statistics

	PAFF_ENV	N	Mean	Std. Deviation	Std. Error Mean
Planning Binary	**1.00**	**12**	**1.00**	**.000**	**.000**
	.00	65	.66	.477	.059
Authority Binary	1.00	12	.67	.492	.142
	.00	65	.49	.504	.062
Planning Ordinal	**1.00**	**12**	**3.25**	**1.545**	**.446**
	.00	**58**	**4.22**	**1.717**	**.225**
Authority Ordinal	1.00	11	4.55	1.695	.511
	.00	63	4.51	1.722	.217
Planning: Political	1.00	0(a)	.	.	.
	.00	22	2.09	.750	.160
Authority: Political	1.00	4	3.00	.000	.000
	.00	33	2.33	.854	.149
Planning: Watershed	1.00	12	1.42	.515	.149
	.00	36	1.89	.575	.096
Authority: Watershed	1.00	7	1.57	.535	.202
	.00	30	1.90	.403	.074

a t cannot be computed because at least one of the groups is empty.

Table H3 (continued)

Independent Samples Test

Environ-mental Affiliation compared to all other Affiliations		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff-erence	Std. Error Diff-erence	95% Confidence Interval of the Difference	
									Lower	Upper
Planning Binary	Equal var assumed	100.292	.000	2.445	75	.017	.34	.138	.063	.614
	not assumed			5.722	64.000	**.000*****	**.34**	.059	.220	.457
Authority Binary	Equal var assumed	7.779	.007	1.105	75	.273	.17	.158	-.140	.489
	not assumed			1.123	15.564	.278	.17	.155	-.156	.504
Planning Ordinal	Equal var assumed	.000	.986	-1.82	68	**.074***	**-.97**	.536	-2.044	.096
	not assumed			-1.949	17.128	.068	-.97	.500	-2.028	.080
Authority Ordinal	Equal var assumed	.003	.955	.067	72	.947	.04	.561	-1.082	1.157
	not assumed			.068	13.855	.947	.04	.555	-1.154	1.229
Planning: Political	Equal var assumed	18.939	.000	1.542	35	.132	.67	.432	-.211	1.544
	not assumed			4.485	32.000	.000	.67	.149	.364	.969
Authority: Political	Equal var assumed	.570	.454	-2.526	46	.015	-.47	.187	-.849	-.096
	not assumed			-2.671	20.895	.014	-.47	.177	-.840	-.104
Planning: Watershed	Equal var assumed	4.122	.050	-1.829	35	.076	-.33	.180	-.693	.036
	not assumed			-1.528	7.666	.167	-.33	.215	-.828	.171

Table H4. Comparison of Means for Managerial Problem Bounding (Primary Affiliation is Government)

Group Statistics

	PAFF_GOV	N	Mean	Std. Deviation	Std. Error Mean
Planning Binary	1.00	22	.68	.477	.102
	.00	55	.73	.449	.061
Authority Binary	1.00	22	.41	.503	.107
	.00	55	.56	.501	.067
Planning Ordinal	1.00	20	4.10	1.774	.397
	.00	50	4.04	1.714	.242
Authority Ordinal	1.00	21	3.71	2.148	.469
	.00	53	4.83	1.397	.192
Planning: Political	1.00	7	2.29	.951	.360
	.00	15	2.00	.655	.169
Authority: Political	1.00	13	1.85	.987	.274
	.00	24	2.71	.550	.112
Planning: Watershed	1.00	13	1.69	.480	.133
	.00	35	1.80	.632	.107
Planning Binary	1.00	8	1.88	.354	.125
	.00	29	1.83	.468	.087

Table H4 (continued)

Independent Samples Test

Local Government Affiliation compared to all other Affiliations		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Planning Binary	Equal var assumed	.565	.455	-.394	75	.695	-.05	.115	-.275	.184
	not assumed			-.384	36.780	.703	-.05	.118	-.285	.194
Authority Binary	Equal var assumed	.212	.646	-1.222	75	.225	-.15	.126	-.406	.097
	not assumed			-1.219	38.558	.230	-.15	.127	-.411	.102
Planning Ordinal	Equal var assumed	.186	.668	.131	68	.896	.06	.458	-.854	.974
	not assumed			.129	33.995	.898	.06	.465	-.885	1.005
Authority Ordinal	Equal var assumed	17.290	.000	-2.638	72	.010	-1.12	.423	-1.959	-.273
	not assumed			-2.203	26.973	**.036****	**-1.12**	.507	-2.155	-.077
Planning: Political	Equal var assumed	3.791	.066	.826	20	.419	.29	.346	-.436	1.007
	not assumed			.719	8.762	.491	.29	.397	-.617	1.188
Authority: Political	Equal var assumed	20.305	.000	-3.430	35	.002	-.86	.251	-1.373	-.352
	not assumed			-2.914	16.138	**.010*****	**-.86**	.296	-1.489	-.235
Planning: Watershed	Equal var assumed	.499	.484	-.556	46	.581	-.11	.194	-.498	.282
	not assumed			-.630	28.287	.533	-.11	.171	-.457	.242
Planning Binary	Equal var assumed	1.040	.315	.265	35	.792	.05	.179	-.315	.410
	not assumed			.311	14.559	.760	.05	.152	-.278	.373

Local government affiliation: smaller scale overall, smaller political scale

Table H5. Comparison of Means for Managerial Problem Bounding (Primary Affiliation is Water)

Group Statistics

	PAFF_WAT	N	Mean	Std. Deviation	Std. Error Mean
Planning Binary	1.00	10	.70	.483	.153
	.00	67	.72	.454	.055
Authority Binary	1.00	10	.60	.516	.163
	.00	67	.51	.504	.062
Planning Ordinal	1.00	9	4.44	2.007	.669
	.00	61	4.00	1.683	.216
Authority Ordinal	1.00	10	4.90	1.197	.379
	.00	64	4.45	1.772	.222
Planning: Political	1.00	3	1.67	.577	.333
	.00	19	2.16	.765	.175
Authority: Political	1.00	4	2.75	.500	.250
	.00	33	2.36	.859	.150
Planning: Watershed	1.00	6	2.17	.753	.307
	.00	42	1.71	.554	.085
Planning Binary	1.00	6	1.83	.408	.167
	.00	31	1.84	.454	.082

Table H5 (continued)

Water Utility Affiliation		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Planning Binary	Equal var assumed	.042	.838	-.106	75	.916	-.02	.155	-.326	.293
	not assumed			-.101	11.504	.921	-.02	.163	-.372	.339
Authority Binary	Equal var assumed	2.588	.112	.540	75	.591	.09	.171	-.249	.434
	not assumed			.530	11.706	.606	.09	.175	-.289	.474
Planning Ordinal	Equal var assumed	.000	.994	.722	68	.473	.44	.616	-.784	1.673
	not assumed			.632	9.733	.542	.44	.703	-1.127	2.016
Authority Ordinal	Equal var assumed	4.365	.040	.768	72	.445	.45	.582	-.713	1.607
	not assumed			1.019	15.950	.324	.45	.439	-.483	1.377
Planning: Political	Equal var assumed	.489	.492	-1.057	20	.303	-.49	.465	-1.461	.478
	not assumed			-1.304	3.234	.277	-.49	.377	-1.642	.660
Authority: Political	Equal var assumed	4.682	.037	.874	35	.388	.39	.442	-.511	1.284
	not assumed			1.326	5.468	.237	.39	.291	-.344	1.116
Planning: Watershed	Equal var assumed	.378	.542	1.791	46	**.080***	**.45**	.253	-.056	.961
	not assumed			1.418	5.799	.208	.45	.319	-.335	1.240
Planning Binary	Equal var assumed	.117	.734	-.027	35	.979	-.01	.200	-.411	.400
	not assumed			-.029	7.612	.978	-.01	.186	-.437	.426

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