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Environmental management reform through the  
Watershed Approach:  
A multi-case study of state agency implementation

A Dissertation Presented for the  
Doctor of Philosophy Degree  
The University of Tennessee, Knoxville

Julie Mawhorter  
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## **Dedication**

*This dissertation is dedicated with love to my mother-in-law Sonya Lynn Mawhorter, whose life of constant service in this world will forever inspire me to offer my best, and to the benevolent source of Grace which has woven our paths together.*

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## Abstract

In the past two decades, there has been a growing consensus regarding the inadequacies of the existing environmental policy regime and the need for reform to address complex, cross-jurisdictional sustainability challenges, such as nonpoint source pollution. Reform theory has focused on the need for more *integrated, collaborative, adaptive, and results-oriented environmental management*, while empirical studies have highlighted the wide implementation gap due to an array of institutional obstacles. Key principles and challenges of these four reform dimensions were synthesized in this study and used to assess implementation of the *watershed approach* by the U.S. Environmental Protection Agency and states since the early 1990s. This dissertation used a qualitative multiple case study design to examine the evolving watershed reform strategies of North Carolina, Georgia, and Kentucky, drawing on extensive document review and interviews with over 50 agency managers. Using an environmental federalism framework adapted from Scheberle (2004), the study explored the role of the national and regional EPA policy context, as well as state-level factors, in helping to shape the watershed approach strategies in the state cases. The research revealed that while EPA provided important initial support of state watershed management, its fragmented, output-driven program management continues to be a barrier to reform. EPA Region 4's recent reform efforts demonstrate that regional offices can take critical steps to incorporate the watershed approach into internal agency management processes and external relations with states and stakeholders, but these changes often go against the grain of agency culture and norms. State agencies have made progress but face similar reform challenges, and their strategies are further shaped by important policy drivers, constraints, and resource limitations at the state level. More substantial investment is needed by EPA and states to: *strengthen internal and external watershed coordination roles and forums; support collaborative stakeholder initiatives more fully where needed; and manage adaptively and accountably towards collectively defined watershed outcome targets.*

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## Chapter 1: Introduction

At the close of the 20<sup>th</sup> century, scholars and practitioners turned attention to the lessons learned from past decades of environmental policy implementation in the United States, seeking vision and guidance for the new century ahead (Durant, Fiorino & O’Leary, 2004; Kettl, 2002; National Academy of Public Administration [NAPA], 2000). Although the environmental decade of the 1970s produced a robust structure of legislation, regulations, and programs to protect air, water, land, and wildlife, many have critiqued the costs and limitations of their top-down, command-and-control design. Summarizing a growing reform consensus that includes many of the architects of these “first generation” policies, Durant et al. (2004) note:

Their argument has been less a product of the failure of the earlier regulatory paradigm that they helped to create and more a realization that the environmental problems that remain are largely beyond its abilities to address efficiently, effectively, equitably, and accountably. (p. 644)

To address the complex, cross-jurisdictional sustainability challenges of the 21<sup>st</sup> century, reformers argue for new approaches to environmental governance that foster resilient ecosystems, promote collaborative solutions among diverse public, private and civic interests, and transform bureaucratic deficiencies through efficient, flexible, and adaptive policy tools.

Within this larger environmental governance reform movement, an array of scientists, government agencies, and civic interests have called for and embraced a “watershed approach” to address interconnected ecological, social, and economic issues at the watershed scale (National Research Council [NRC], 1999). Watershed thinking is by no means new – as early as the late 1800s, John Wesley Powell advocated organizing the new political boundaries of the western frontier of the United States by hydrological boundaries. However, comprehensive watershed management has been mostly an elusive policy ideal amidst the enduring reality of fragmented institutions and politics that govern water and land (Adler, 1995; Blomquist & Schlager, 2005; Feldman, 2007). Watershed

thinking gained momentum in the 1990s as a “bottom up” civic movement occurring on the ground, with a wave of new collaborative watershed partnerships rising up across the country to address local issues (Sabatier et al., 2005). At the same time, for government agencies such as the U.S. Environmental Protection Agency (EPA), the watershed approach offered a promising set of principles for reforming management practices to more effectively target pressing environmental problems in collaboration with other agencies and stakeholders. However, the extent and process of actual implementation of the watershed approach by federal and state agencies has received limited scholarly investigation.

This study examined the evolution of state agency efforts to translate the watershed approach principles into practice, from the adoption of new watershed management frameworks in the early 1990s through their incarnations in 2009, at the time of this study. A qualitative multiple case study approach was utilized to understand state water quality agencies’ reform strategies within the multifaceted context of federal and state policy factors that play a role in shaping agency decisions. The three state cases of North Carolina, Kentucky, and Georgia reflect varied state contexts and implementation strategies within the common setting of the Southeast region and EPA Region 4 oversight. This setting was chosen in part based on EPA Region 4’s leadership in promoting watershed approach reforms in the agency at the national and regional level. This introductory chapter provides background on the research problem and rationale for the study, followed by an overview of the research purpose, questions, and methodological approach.

## **1.1 Background & Context**

The Clean Water Act of 1972 set the ambitious target to make all waters fishable and swimmable by 1983. Now, over three decades later, the goal remains elusive, with around 50% of the rivers and streams assessed by states currently listed as not meeting water quality standards (EPA, 2010a). The initial implementation of the statute focused on cleaning up the more glaring and tractable problem of point source pollution from

industry and municipal wastewater. Significant pollution reductions were achieved through major federal investments in public wastewater infrastructure combined with a strong regulatory permitting system of mandated technology standards, effluent limits, and stiff penalties for noncompliance. Now, the major causes of water pollution – sediment, nutrients, pathogens, habitat alteration – stem from nonpoint sources, the dispersed, difficult to regulate impacts that accumulate across the rural and urban landscape. The dilemma is dramatically illustrated in the Gulf of Mexico’s dead zone caused by the Mississippi River’s accumulation of agricultural nutrients. Many policy scholars have argued that the existing regulatory tools are insufficient or inappropriate to address nonpoint source pollution, emphasizing the need for new collaborative policy tools to address problems at the watershed scale.

The watershed approach reflects a significant strand within the larger body of discourse on environmental governance reform for the 21<sup>st</sup> century (Kettl, 2002; NAPA 2000; Durant et al., 2004). As a whole, this discourse recommends a shift towards environmental policy and management that is more *integrated, collaborative, adaptive, and results-oriented*. These four dimensions of reform, briefly introduced here, are elaborated in the study’s literature review (Chapter 2) and used as a theoretical framework to assess watershed approach implementation in the study.

*More integrated...*

Since the discipline of ecology gained prominence in the 1960s, there has been a growing awareness of the complexities and interrelationships of ecological systems and the need for holistic, integrated environmental management (Born & Sonzogni, 1995). However, the tendency of modern bureaucracy is to break the management of complex systems into many small parts, each managed for efficiency. For example, EPA has since its inception been structured around separate media-based programs for air, water and land, despite longstanding arguments for cross-media management of pollution. Natural resource management has long been fractured among an array of single-purpose agencies for water resources, forests, wildlife, agriculture, and others. Principles of ecosystem and

watershed management that became prominent in the 1990s shifted the focus from a narrow emphasis on individual projects, pollutants, or species to a holistic emphasis on sustaining the multiple values of the larger ecological system (Grumbine, 1997).

*More collaborative...*

Aligned with the need for greater scientific and social integration, reform theory has stressed the importance of collaborative management approaches. Collective action problems such as nonpoint source pollution cannot be unilaterally addressed by a single government agency but rather require effective cooperation of a network of public, private, and civic interests. Indeed, a government agency's ability to fulfill its mandates increasingly depends on its ability to effectively partner, leverage resources, and address multiple, often conflicting interests in complex governance networks (O'Toole, 1997). Collaborative management also emphasizes the critical role of stakeholder involvement and public participation in government decision processes. Starting in the Progressive Era of the early 20<sup>th</sup> century, natural resource management was dominated by professional experts in government agencies with limited opportunities for public input. Procedural requirements for public notice, hearings, and comment have expanded access to environmental decision making for citizens and interest groups. However, as debilitating conflict and gridlock reign around many environmental policy problems, demand has increased for effective, deliberative forums that foster substantive stakeholder participation and consensus-building in environmental management (Wondolleck & Yaffee, 2000).

*More adaptive...*

As appreciation has grown of the considerable uncertainties surrounding human impacts on complex ecological systems, reform theory highlights the need for adaptive management approaches. Adaptive management, first articulated by systems ecologists in the 1970s, recommends implementing environmental policies as large-scale scientific experiments, carefully monitored to maximize learning about the ecosystem's function and response (Holling, 1978; Walters, 1986). Environmental policies and their

implementing bureaucracies have been critiqued for their inability to respond and adjust to new scientific knowledge, changes in environmental and socioeconomic conditions, and evolving social values and preferences. Adaptive management focuses on a structured decision process to develop and test a range of management strategies for achieving desired ecological and socioeconomic goals. Monitoring the outcomes and adjusting management strategies based on new information are critical to the process. Adaptive management techniques have been applied to large-scale watershed management efforts in the Columbia River Basin, Colorado River, Florida Everglades, and other national and international contexts (Lee, 1993; Gunderson & Light, 2006). *More results-oriented...*

In the 1990s, public management reform across policy arenas focused on a shift towards holding government agencies accountable for performance, or how well programs achieved their intended outcomes. In this vein, the National Performance Review spearheaded by the Clinton administration generated 10 principles and 25 high priority actions for “reinventing environmental management” (Clinton & Gore, 1995). Several related policy innovations were pursued by EPA that allowed greater flexibility in exchange for accountability for environmental performance targets, such as Project XL for industry and the National Environmental Performance Partnership System for state agencies (NAPA, 2000). Some of the basic strategies for results-oriented management involve strategic planning, targeting resources towards priority problems, and developing and tracking indicators of environmental progress. Market-based policy tools, such as pollutant trading schemes that allow regulated entities flexibility in the means for meeting overall pollution targets, have also been promoted (Kerr, Anderson & Jaksch, 2000). Results-oriented management requires a fairly radical shift in the orientation of public agencies, from narrow program output measures (number of permits issued, grants distributed) towards cross-program environmental outcome targets (number of stream miles restored).

Reform frameworks like the watershed approach and ecosystem management reflect a synthesis of these key dimensions of reform. For example, the watershed approach, as articulated by EPA, calls for better integration of programs, interagency coordination, stakeholder involvement, and adaptive management to strategically target and achieve improved watershed results (EPA, 1996; EPA, 2010b). Because of their inherent complexity, these reform frameworks are often interpreted in a variety of ways depending on the context, purpose, and orientation of the user. Thus, there can be considerable ambiguity or fuzziness in defining what they entail and how to apply them. Further, many have noted how these reforms are often broadly embraced as “buzzwords” in broad policy rhetoric, with inadequate attention to the organizational strategies and challenges of operationalizing them into practice (Imperial, 1999). Each reform dimension entails going against the grain of existing policy structures and agency norms. The empirical reform literature is rife with examples of the implementation gaps between principles and practice, as well as the many institutional and political barriers to change.

Environmental policy in the United States has been designed within a political system of federalism that distributes authorities and responsibilities among federal, state, and local levels of government. This system is particularly relevant in the implementation of federal statutes like the Clean Water Act, wherein overarching authority to set standards, promulgate regulations, and oversee programs rests with EPA while much of the day-to-day implementation of programs is delegated to state environmental agencies. The federal regulations set a minimum bar for state programs, upon which states can choose to build additional standards, protections, and programs. For example, the Clean Water Act does not give EPA or states regulatory authority over nonpoint source pollution, although some states have elected to incorporate certain mandatory nonpoint source pollution control policies (Hoornbeek, 2005). While the national headquarters of EPA deals with federal standards, regulations, and program administration, the 10 regional EPA offices work more directly with states in overseeing and administering programs.



In the decades since the environmental statutes of the 1970s consolidated major new regulatory authorities in the federal government, there has been a general trend towards increased devolution, or decentralization, of authority to state and local levels (Scheberle, 2004). One argument for devolution in environmental management, as well as other policy arenas, is that it brings decision making closer to the problems and people of interest. Rather than setting one-size-fits all policies in Washington, state and local governments, it is argued, should have flexibility and discretion to design policy solutions that work in their particular environmental, political, and cultural contexts. Early scholarship on state environmental policy suggested a “race-to-the-bottom” where competition for economic development at the state level drives a trend towards weaker environmental protections. However, since that time state environmental programs on the whole have grown considerably in resources and technical capacity as programs have matured and responsibilities have expanded in scope and complexity. While problems still exist with weak and inadequately funded state programs, some states have proven to be “laboratories of innovation,” leading the way on difficult issues like greenhouse gas regulation where federal policy action has stalled (Rabe, 2006).

In the arena of water quality, EPA and many states have taken steps to adopt innovations in alignment with the watershed approach principles. Since the early 1990s, EPA has been encouraging the watershed approach in its policy guidance and developing resources to support its implementation by states and local groups. By 2002, over half the states had adopted a new watershed management framework of some kind, with varying scopes and strategies (EPA, 2005). Little scholarly research has been conducted to assess the process and outcomes of these agency watershed approach reform strategies. Two EPA evaluations, which provide the best information available, suggest that while EPA and states have made some progress, many institutional challenges have limited the extent of implementation (EPA, 2002a, 2005). Prior work has suggested that supportive state agency programs can be a critical factor influencing the effectiveness of collaborative watershed partnerships (Genskow, 2001). More research is needed to

understand how states have implemented the watershed approach reform, what factors have shaped and constrained these choices, and the extent of progress made towards more integrated, collaborative, adaptive, and results-oriented management.

## **1.2 Statement of Research Problem**

The watershed approach has been emphasized as a critical reform arena to better address environmental problems through integrated, collaborative, adaptive, and results-oriented management strategies. However, putting these principles into practice within the constrained contexts of implementing agencies is often fraught with institutional challenges. State environmental agencies may be important laboratories for these innovations, serving as bridges between top-down federal policy structures and bottom-up local governance efforts. However, little research has been done on the process and outcomes of state watershed approach reforms to assess the extent to which these institutional barriers have been or can be overcome.

## **1.3 Statement of Purpose and Research Questions**

The overarching aim of this research was to explore how key environmental management reform principles can be effectively put into practice within the constrained environment of implementing agencies. Towards this end, the purpose of this multiple case study was to describe and assess state agency implementation of the watershed approach reform. To fulfill this purpose, three interrelated, exploratory research questions provided focus for the study:

### **1. How have state agencies operationalized the watershed approach reform through specific management strategies over time?**

The first and central task of this research is to describe how the reform principles of the watershed approach have been operationalized into agency practice through specific management strategies. These strategies might include changes to agency policy, structure, resource allocation, and decision processes, including support for new agency roles, programs, or coordination mechanisms. This study examines the reform implementation story as it has evolved over time, from initial adoption of a state

watershed management approach in the early 1990s through major changes en route to its expression at the time of data collection in 2009.

**2. What contextual factors at the federal and state level helped to shape state agency reform strategies?**

The second research question explores elements of the environmental federalism context that have been important in shaping state reform implementation choices. For example, what aspects of EPA policy and program management have been drivers or facilitators of state watershed approach efforts, and what aspects seem to hinder innovation? In the complex and dynamic landscape of policy implementation, it is difficult if not impossible to isolate and quantify causal relationships among contextual variables and implementation outcomes. Therefore, this study takes an exploratory and holistic approach, focusing on connections between context and implementation process that emerge from agency manager perspectives and other case data. The analysis illustrates a range of issues and quandaries which could be the focus of more targeted explanatory research in the future.

**3. What have been the reform outcomes in terms of progress towards more integrated, collaborative, adaptive and results-oriented management?**

The third research question provides a multi-dimensional framework for assessing agency implementation of the watershed approach based on environmental governance reform theory. The characteristics and key issues for each reform dimension are developed in the literature review (Chapter 2) and incorporated into the case study design and cross-case analysis. The aim of this study is not evaluative in the sense of measuring what agencies have done against a normative benchmark of what they *should* be doing according to the reform literature. Rather, the reform dimensions are used to connect case findings with the larger body of scholarship on environmental governance reform, so that each can inform the other.

## 1.4 Research Approach

This dissertation was designed within a qualitative research approach, seeking to understand the multifaceted process of management reform within specific contexts from the firsthand experiences of agency managers. Thus, the aim was not to test or generate explanatory relationships between specific implementation variables and outcomes. A multiple case study research design was employed for its ability to provide rich, holistic description of a complex phenomenon in relation to its context (Stake, 1995). The unit of analysis for each case was the state water quality agency's watershed approach implementation from the time of adoption in the early-mid 1990s to around 2009 when data collection occurred. Conducting a multiple case study analysis allowed for exploring a greater range of expressions and patterns in state context and watershed approach implementation strategies (Stake, 2006; Yin, 2009).

The case set was selected within the southeastern United States, corresponding with EPA Region 4. Choosing states in the same region helped to reduce some elements of variation in state context (e.g. differences in western and eastern water law) enabling a more focused analysis of similarities and differences in the states' organizational strategies (Blomquist, Heikkila, & Schlager, 2004). EPA Region 4 was selected as the setting for the cases based on recognition by EPA officials of the region's leadership in promoting watershed approach reforms at the national, regional, and state level. This facilitated a nested analysis of the environmental federalism setting, in which the EPA national and regional policy context was first described to frame the state cases and then incorporated into the cross-case analysis of findings in Chapter 6. The state cases of North Carolina, Kentucky, and Georgia were chosen with EPA input to maximize learning and theoretical relevance by demonstrating variation in state contexts and implementation strategies.

Data collection for the study consisted of extensive document review and 45 key informant interviews conducted in three phases during 2007-2009: EPA national context, EPA Region 4, and the three state cases. The interview participants were agency leaders

and program managers selected for their experience with and diversity of perspectives on watershed approach implementation. Interviews were approximately one hour in length and semi-structured, following an interview guide of topics with flexibility to pursue relevant lines of inquiry appropriate to each participant. The interviews were recorded and transcribed to accurately capture all information provided. Participants were guaranteed anonymity in the reporting of findings in order to protect confidentiality and promote candid sharing of information. The data from interviews and documents were categorized and analyzed using a coding scheme based on topical categories in the study's conceptual framework. Document collection and analysis occurred before, during and after interviews, serving to supplement and triangulate interview findings. Aligned with the tradition of qualitative research, the study followed an iterative, emergent research design process, wherein the research questions, conceptual framework, and data collection and analysis methods were refined and elaborated as the study progressed.

## **1.5 Contributions and Delimitations of the Study**

In his seminal text on adaptive ecosystem management in the Columbia River Basin, Kai Lee (1993) reflects “today, humans do not know how to achieve an environmentally sustainable economy” (p. 8). The solution he recommends is a path of learning from our policy experiments to improve strategies and outcomes over time. Too often, the everyday management experiments of government agencies and others proceed without proactive efforts to learn from the implementation process and adjust strategies as appropriate. This study contributes by shining a light on the experimental efforts of state agencies and EPA to put an important reform, the watershed approach, into useful practice over almost two decades. The learning harvested from the cases will hopefully provide both a status report on reform progress and a springboard for further research and experimentation to improve practice. The multidimensional reform framework, covering integrated, collaborative, adaptive, and results-oriented management, provides a model

which researchers and practitioners can use or adapt in other cases of environmental governance reform.

As in all research, the scope and boundaries of this study allow for greater understanding of certain issues, while other important questions remain unexplored or unanswered. This study aims to capture the “big picture” story of state watershed implementation efforts over time and does not delve into intricacies of particular program areas, initiatives, or agency dynamics. The analysis relies on perspectives of certain key informant agency managers and does not survey perspectives of all staff within the agency. Moreover, in order to stay focused on the management reform process within the agency, the analysis does not aim to include the perspectives of other players in the watershed governance network, such as other agencies and stakeholder groups. Those perspectives are an important part of understanding and evaluating reform progress, but were beyond the feasible scope of this study. In casting a wide net of exploratory investigation, the study illuminates an array of issues and questions which would benefit from more targeted investigation in future studies.

## **1.6 Structure of the Dissertation**

Chapter 2 reviews literature on four environmental governance reform dimensions – integrated, collaborative, adaptive, and results-oriented management – that provide the theoretical basis for understanding and assessing watershed approach implementation in this study. It also summarizes the environmental federalism context and introduces the conceptual framework that was used to design, implement, and analyze the case studies. Chapter 3 presents the research design and describes the methods used for data collection and analysis. Chapter 4 provides an overview of the national and regional policy context for the state case studies, including the Clean Water Act programs that structure EPA and state responsibilities and EPA’s watershed approach guidance and strategies over time. It also reviews the watershed approach efforts of EPA Region 4 as the immediate setting for the state cases in this study. Chapter 5 presents the case study reports for the three states of North Carolina, Georgia, and Kentucky. Chapter 6 provides a cross-case discussion of

findings and conclusions relevant to the theory and practice of environmental governance reform.

## **Chapter 2: Environmental Governance Reform**

### **2.1 Introduction**

The purpose of this chapter is to synthesize principles from the literature on key dimensions of environmental governance reform and the issues facing their implementation in the context of environmental federalism. Four dimensions of reform relevant to the watershed approach, and to environmental governance more broadly, are developed: integrated, collaborative, adaptive, and results-oriented management. A conceptual framework is presented for understanding the role of federal and state contextual factors in helping to shape reform implementation strategies and outcomes.

At the close of the 20<sup>th</sup> century, policy scholars took stock of the successes, failures, and lessons learned from decades of implementation of “first-generation” environmental policies in the U.S., such as the Clean Water and Clean Air Acts (Durant et al., 2004; Kettl, 2002; NAPA, 1995). Environmental governance had been dominated by command-and-control environmental and natural resource policies which centralized authority in federal agencies. Although great strides were made in environmental pollution control and in conserving public lands for the “sustained yield” of natural resources, many criticisms have been leveled at the costs of the existing policy system and its limited ability to address complex sustainability dilemmas facing the 21<sup>st</sup> century. Durant et al. (2004) note that many of the architects of first-generation environmental policies have called for major reforms because “the environmental problems remaining cannot be addressed efficiently, effectively, equitably, and accountably” by the existing governance regimes (p. 6).

Just as environmental governance critiques are multifaceted, encompassing scientific, political, economic, social, and institutional arguments for change, the resulting reform recommendations are typically ambitious, and embedded in multidimensional frameworks. They call for transformation on multiple levels and in multiple directions at once. For example, the Clinton administration’s framework for



reinventing environmental regulation set forth 10 principles for reform, calling simultaneously for management that is more environmentally protective, cost-effective, collaborative, flexible, and accountable for results (Clinton & Gore, 1995). Ecosystem management and the watershed approach, as reform constructs, encompass integrated management of ecological systems, interagency collaboration, stakeholder and citizen participation, and adaptive management (Cortner & Moote, 1999; EPA 1996). As will be shown, change in each of these directions requires significant investment to depart from agency norms and faces considerable institutional obstacles. It can be anticipated that agencies with varying contexts, orientations, and constraints will embrace some reform strategies more readily than others. Therefore, to understand the complexities of implementing a reform framework such as the watershed approach requires a multidimensional assessment of progress and challenges.

Before launching into the reform dimensions, a few words are needed on the terms *governance* and *management* as used in this study. Governance has been defined as “the process by which we collectively solve our problems and meet our society’s needs” (Osborne & Gaebler, 1992, p. 24). The overarching concept of *environmental governance reform* acknowledges that the changes needed must occur not only in the government policies and agencies that have historically dominated environmental management, but in the collective process of public, private, and civic entities at all levels. In this study, however, the focus is on reform efforts within the domain of individual agencies, not on the activities of collaborative governance networks. Therefore the term “management” is used more often than governance. This usage is also consistent with terms used in the literature: integrated environmental management (Born & Sonzogni, 1995), adaptive management (Walters, 1986), collaborative environmental management (Koontz et al., 2004), and results-oriented management (Durant, 1999). However, this distinction is not rigidly applied, because the management reforms covered here often take agencies into the domain of shared power governance processes and relationships.

The sections that follow review the four reform dimensions and aspects of the environmental federalism context that together form the conceptual framework used to relate study findings to prior work on environmental governance reform theory and practice. Section II provides the rationale, key principles and issues, and implementation challenges for each reform dimension, concluding with a discussion of potential relationships, synergies, and tensions among the dimensions. Section III turns to attributes of the environmental federalism context that are important for understanding state policy implementation, drawing on a useful model from Scheberle (2004). The chapter culminates in a conceptual framework for the study which integrates elements of Scheberle's environmental federalism implementation model with reform outcomes in the four dimensions.

## **2.2 Key Dimensions of Environmental Governance Reform**

This section provides a brief review of the four environmental governance reform dimensions of focus in this study: integrated, collaborative, adaptive, and results-oriented management. While excellent book-length reviews have been written on the intricacies of a single dimension, such as adaptive management, this chapter contributes a synthesis of key reform principles and challenges relevant to agency implementation efforts, drawing from multiple strands of literature. The unique features of each reform dimension are emphasized here for the purposes of this study, though it should be noted that in theory and practice there is overlap and blending of principles across the dimensions. These interrelationships are briefly explored in the discussion that concludes this section and more fully examined in the final chapter of this dissertation.

### **Integrated Management**

*“Lasting solutions to many remaining water quality and environmental problems require an integrated management approach that addresses all water-related issues within hydrologic boundaries.” (National Research Council, 1999)*

The issue of fragmentation and need for integration have surfaced in a variety of environmental and natural resource management contexts. The EPA has long divided

environmental pollution control into the distinct media-based categories of air, water, and land, based on the separate federal statutes governing each category. Despite longstanding arguments for an integrated approach which recognizes and manages the movement of pollutants across media, EPA, and states following suit, have remained highly compartmentalized in their pollution control efforts (Rabe, 1986). The management of natural resources has also been fragmented into predominantly single-purpose agencies, such as those dealing with forests, grazing lands, water resources, and wildlife. In the 1990s, recognition of the need for better integrating the diverse, often conflicting ecological and socioeconomic natural resources goals for public lands coalesced in a new “ecosystem management” paradigm embraced by many agencies. Two key principles of this paradigm include shifting the scale of management from individual resources to ecological systems and managing resources in a way that sustains the ecological integrity of the system (Grumbine, 1997)

Arguments for integration have perhaps been most prominent in the extensively fragmented domain of water policy and management. For many, watersheds, which include the land area draining to a common body of water, represent clear, practical ecological boundaries for managing interrelated water and land resources (NRC, 1999; Ruhl, 1999). This was recognized in the late 1800s by John Wesley Powell, who proposed to Congress organizing the new political jurisdictions of the western frontier by watershed boundaries (Worster, 2003). However, in policy and practice, the management of water has long been splintered among numerous institutional and functional boundaries. Perhaps most problematic is the fundamental divide in US water policy between water quality, regulated by EPA and states under the Clean Water Act, and water quantity which is left to the discretion of states (Feldman, 2007; Gerlak, 2006). Authority for managing different aspects of a watershed is further fractured politically among many federal, state, and local government entities and functionally with separate programs for ground and surface water, wetlands and wildlife, and the array of impacting land uses (Adler, 1995).

Looking across the multiple terms, definitions, and contexts that emphasize integration in the literature, Born and Sonzogni (1995) identified four common conceptual elements. First, a *comprehensive* or holistic approach to managing the environment should be the focus, which implies greater inclusivity of ecological and socioeconomic factors incorporated into decision making. Summarizing principles distilled from a number of scholars, the authors write that integrated environmental management:

Must embrace all the critical biophysical, chemical, and human parts of an ecological system; all the significant present and potential uses and objectives for the system; and all the entities – public and private – that affect or can be affected by management. (p. 170)

A second *interconnective* aspect of integrated management entails addressing the important interrelationships and linkages among these factors. Third, once the comprehensive range of issues and interrelationships has been considered, there must be a *strategic*, or reductive, process of bounding the complexity and deciding a reasonable scope and scale of objectives to be addressed by management activities. Finally, achieving this level of integration requires a *coordinative* process that draws together the necessary disciplinary knowledge, management authorities, and stakeholder values to understand and address problems in a holistic manner.

Integrated management involves a shift in the scale of management from individual units – projects, permits, land parcels, stream segments – to the larger ecological system of concern (Adler, 1995; Grumbine, 1997). While the rationale for using an ecological scale is fairly straightforward, deciding the appropriate scale and geographical boundaries is fraught with many considerations and complexities. One critique of ecosystem management has been the inherent fuzziness in defining ecological boundaries (Grumbine, 1997), leading some to argue for watersheds as clear, practical units for ecosystem management (Ruhl, 1999). However, watersheds exist at multiple scales in a nested pattern, from the smallest subwatersheds draining local streams to the largest river basins that cross multiple states or nations, such as the Great Lakes drainage

basin. There is not a universal prescription for what watershed scale should be used for what management efforts; the appropriate scale depends on the problems and goals of interest in the management effort (Adler, 1995). Further, the concept of a “problemshed” has been used to describe contexts where the sources of problems lie beyond watershed boundaries but nonetheless need to be incorporated into the management process (NRC, 1999).

Despite longstanding arguments for integrated management, many have noted the institutional and political hurdles that have created an “implementation gap” between prescription and practice (Blomquist & Schlager, 2005; Born & Sonzogni, 1995). A major reason cited for this gap is the mismatch between ecological boundaries and political jurisdictions (Cortern & Moote, 1999; Grumbine 1997). Blomquist and Schlager (2005) argue that “as a unit of organization, ‘the watershed’ does not resolve fundamental political questions about where the boundaries should be drawn, how participation should be structured, and how and to whom decision makers within a watershed are accountable” (p. 102). In sum, although there may be many scientific considerations and justifications that play into scale and scope decisions, the inherent political aspects of boundary drawing should be acknowledged and given explicit attention.

Other major reasons noted for the implementation gap relate to the fragmented policy and programmatic structure for environmental management that has endured despite calls for reform and broad-brush embraces of integrated management in agency policy statements. In the absence of a fundamental restructuring of the EPA around a central cross-media mandate or a revamping of the Clean Water Act around comprehensive watershed management, integrative reforms must be forged as piecemeal initiatives and incremental progress at the margins of a policy regime that continues to reinforce segmentation. Even where agency policy and leadership promotes an integrated approach, the agency’s culture or individual managers may be resistant to new, more complicated ways of working across disciplinary expertise and functional units.

Given the many barriers and implementation gaps, critical questions remain as to what institutional structures and strategies can be used to foster integrated management of ecological systems (Imperial, 1999; Ostermeier, 1999). While some emphasize the need for new comprehensive institutions at the basin and/or watershed scale (e.g. Ruhl et al., 2003), others note the pragmatic advantages of polycentric decision arrangements among existing authorities (Blomquist & Schlager, 2005). A common theme is the importance of effective coordination mechanisms that promote interaction among the agencies, jurisdictions, and stakeholders whose knowledge, expertise, resources, interests, and values are needed at the table to achieve integrated management (Born & Sonzogni, 1995; Cortner & Moote, 1997).

In summary, a predominant theme in environmental governance reform theory has been the problem of institutional fragmentation and the need for more integrated environmental management. This involves a shift from a narrow focus on particular pollutants, projects, or resource outputs to a comprehensive inclusion of the many environmental and social factors affecting the sustainability of the larger ecological system. Understanding a given integrated management effort involves attending to issues of scale and scope, where the management boundaries chosen reflect a mix of scientific, political, and strategic concerns. Integrated management reforms are often constrained in practice by enduring fragmentation in the policy framework, bureaucratic and professional norms that favor specialization and compartmentalization, and the predominant influence of political jurisdictions that do not align with ecological boundaries. Coordination mechanisms can be critical to foster integration among the disparate sources of knowledge, authority, and values in the ecological system of interest, which blends into the next dimension of reform.

This dissertation examines integration in terms of how state agencies have shifted the scale of management to watersheds, expanded the scope of issues addressed, and promoted coordination among relevant functional areas, programs, and agencies.

## Collaborative Management

A second major direction of environmental governance reform has been an increasing role for stakeholders and citizens in environmental management processes. This trend has arisen in part from the reality that many environmental challenges fall in the category of “wicked problems”, where the authority, information and resources needed to address them are split among many public, private and civic entities, necessitating collective action (Rittel & Webber, 1973; Van Bueren, Klijn & Koppenjan, 2003). In this study, the collaborative management dimension covers two main issues of relevance to agencies: participation mechanisms for public involvement in agency decision making and agency roles in collaborative governance processes. While there have been many positive examples of agencies working to expand participation and collaboration, a number of challenges and strategic considerations surround these efforts (Wondolleck & Yaffee, 2000). This section highlights the rise of participatory mechanisms in environmental management and then explores government roles in collaborative governance processes.

For most of the 20<sup>th</sup> century, natural resource management was dominated by the “scientific management” paradigm, where professional experts in federal agencies were entrusted to steward the nation’s resources with little involvement of the public (Cortner & Moote, 1997). With concerns over the growing scope and power of the federal bureaucracy, the Administrative Procedures Act of 1946 and environmental legislation of the 1970s institutionalized public participation requirements in agency decision making. These mechanisms allow for citizens and interest groups to express their preferences on major agency policy decisions through public comment periods and hearings. Although these required participation processes remain important formal venues for incorporating public preferences, many critiques have been leveled at their limitations: they require agencies to consider input, not guaranteeing agency responsiveness; they allow for “token” input at the beginning and end of agency decision making, not substantive participation throughout decision processes; they serve as stages for competing interests

and agendas to be acted out, not forums for the deliberative problem-solving needed to address underlying value conflicts (Beierle & Cayford, 2002; Kemmis, 1990; Koontz et al., 2004). These limitations, as well as the atmosphere of conflict and gridlock surrounding many environmental issues, have sparked demand for more meaningful and constructive participatory forums (Weber, 2003; Wondolleck & Yaffee, 2000).

There is a wide range of participation mechanisms that can be used by agencies and many strategic considerations influencing their use (Beierle & Cayford, 2002; Fung, 2006; Irvin & Stansbury, 2004; Steelman & Ascher, 1997). Participation mechanisms can vary along a spectrum in three important dimensions: 1) degree of exclusiveness/inclusiveness in participant selection methods, 2) level of authority and power of the participatory forum, and 3) intensity of communication and decision modes, ranging from passive listening as a spectator to active deliberation, negotiation and deployment of expertise (Fung, 2006). Effective environmental management decision processes require striking a balance between the scientific and technical expertise of agencies and the diverse social values of participants surrounding the decision (Steelman, 2001), though participants even in the same decision context often disagree on what this balance should look like (Webler & Tuler, 2006). While many scholars universally laud the benefits of increased civic participation in decision making, Irvin and Stansbury (2004) caution that agencies should carefully weigh the potential advantages and disadvantages of citizen involvement efforts in choosing participatory strategies.

The search for more effective means for stakeholders with different environmental and socioeconomic interests to find common ground solutions has been one of many drivers for more collaborative management approaches. In contentious natural resource decision arenas, particularly in the American West, a costly climate of perpetual litigation, appeals, and gridlock has prompted many agencies and stakeholders to seek collaborative venues. By providing diverse stakeholders a seat at the decision table, collaborative forums can enhance buy in, ownership, and potential for enduring win-win, or at least mutually acceptable, policy compromises (Wondolleck & Yaffee,



2000). The need for integrated strategies to address ecosystem or watershed-scale problems, as discussed earlier, also drives interagency coordination and collaborative institutional structures. This has been seen in large scale, government driven collaborative institutions in the Chesapeake Bay, Columbia River, and Florida Everglades (Heikkila & Gerlak, 2005). The trend is also evident in the “bottom up” proliferation of local watershed partnerships and grassroots ecosystem management efforts that seek locally driven rather than government led decision making (Leach & Pelkey, 2001; Sabatier et al., 2005; Weber, 2003).

The movement towards collaborative environmental management takes place within a broader context of increasing “network” governance in public management (Agranoff & McGuire 1999; Kickert, Klijn & Koppenjan, 1997; O’Toole, 1997). Network governance arrangements provide a means to bring together the fragmented information, expertise, and authority of various public, private, and nongovernmental entities that are needed to address complex, cross-jurisdictional policy problems. Working in a shared power context, governance networks typically function with different organizational structures, decision rules, and accountability issues than those of single agencies or organizations. Thus, agency managers may participate in and greatly influence collaborative networks, but they do not have control over them. Although collaboration is on the rise, many agency managers still spend the majority of their time working within the hierarchy of their agency’s management responsibilities, with only a small portion of their time devoted to network participation (Agranoff, 2006). This suggests that agencies face strategic decisions regarding what collaborative networks to participate in and what roles to play within them.

While the literature on collaborative network processes and outcomes grows, Koontz et al. (2004) bring attention to an important question: *what is the role for government in collaborative management?* The authors explore the question through case studies reflecting varied government roles, providing a useful conceptual framework. First, government influences collaborative management in two primary ways: through

*institutions* – policies, rules, norms, etc – and through *actors*, the agency staff and managers that interface with collaborative efforts. Second, government plays a variety of roles in collaborative management along a spectrum from *following* in processes led by nongovernmental participants to *leading* the process. Between these two ends of the spectrum, government also serves as *encourager* through the “carrots and sticks” (or incentives and sanctions) of its policy tools. For example, strong regulatory provisions of the Endangered Species Act and Clean Water Act can provide a driver for stakeholder collaboration as an alternative to decisions being mandated solely by regulators or the courts. On the nonregulatory end of the spectrum, government grant programs that require collaborative, multistakeholder planning processes also have provided important incentives. Through these various tools and roles, Koontz et al. (2004) find that government has an influence, whether dominant or more subtle, on shaping the problem definition and scope of collaborative efforts, the group structure and decision processes employed, and the resources available for collaboration.

In the domain of watershed management, the proper role of government has been debated, as well as the relative merits and problems of top-down efforts of centralized agencies versus bottom up, “self-organized” efforts at the local level. Some studies have shown that government policy and programs designed to support collaboration can have an important, even critical influence in supporting effective watershed governance at local levels. Sirianni (2006) finds positive evidence that a federal regulator, the EPA, can serve as a “civic enabler” through its investment in various funding mechanisms, technical assistance, and capacity building tools for collaborative watershed management. For example, EPA’s National Estuary Program provides significant resources, technical expertise, and organizational design to collaborative estuary institutions. Researchers found that relative to other collaborative estuary efforts, the networks fostered by the National Estuary Program “span more levels of government, integrate more experts into policy discussions, nurture stronger interpersonal ties between stakeholders, and create greater faith in the procedural fairness of local policy” (Schneider, Scholz, Lubell,

Mindruta & Edwardsen, 2003, p. 143). Genskow (2001) found that state agency policy frameworks that support watershed collaboration can be a critical factor for local partnership success. After conducting a comprehensive evaluation of government supported watershed planning processes in Australia and Oregon, Curtis, Shindler, and Wright (2002) conclude:

It is simply unrealistic to expect an effective network of [watershed groups] to be sustained without substantial investment by government to provide for program management, group coordination, and cost sharing for on-ground work. There must also be the commitment and skills within a program to establish processes that build trust and competency amongst citizens and agencies. (p. 1207)

While these examples suggest positive, even critical roles for government in collaboration, many institutional challenges and barriers have been acknowledged as well. Getting agencies to work together has been a long acknowledged problem due to factors such as differing management goals and strategies, competition for resources and protection of turf boundaries (Bardach, 1998; Scholz & Stiftel, 2005; Wondolleck & Yaffee, 2000). These tendencies can impede basic information and data sharing, cause duplicative or conflicting agency management activities, and generally confound the joint decision making and resource sharing needed to tackle cross-jurisdictional problems. Even when agency managers are interested in working with other agencies and stakeholders, lengthy bureaucratic processes and complicated procedural rules can frustrate efforts to work together and get actions accomplished (Wondolleck & Yaffee, 2000).

Agencies may also face challenges in working beyond their organizational boundaries with citizens and various stakeholder groups. Thomas (1999) summarizes well the organizational differences between federal and state agencies and the local collaborative initiatives they might aim to support, with the former being “externally imposed on local communities, not self-organized within them; structurally hierarchic, not flat; accountable primarily to elected officials at the national or state levels, not to local communities; [and] technocratic, not consensual, in their decision making

processes” (p. 545). Moreover, some agencies may be more receptive to or better structured for collaboration than others. Examining watershed planning initiatives in California, Thomas (1999) found that the decentralized, locally responsive character of the Bureau of Land Management made it more successful in working with watershed groups than the US Forest Service, which has historically been more centralized and unresponsive to local interests. Thus agency culture, and the role orientations of particular managers, can influence how inclusive and effective agencies are in embracing local participants, knowledge, and values.

In summary, the rise in participatory and collaborative management approaches in recent decades reflects a growing demand for more meaningful citizen and stakeholder roles in environmental governance. The tradition of agencies narrowly managing their domain of technical expertise in a relatively insular fashion has been shifting to more open decision processes, wherein agencies face strategic choices regarding how to effectively incorporate diverse values and interests given legal and bureaucratic constraints. The cross-jurisdictional, often conflict-ridden sustainability problems of the 21<sup>st</sup> century necessitate collective civic action and new, effective governance networks. Government roles in these civic processes vary widely, from follower to encourager to leader, and further inquiry is needed to investigate the potential positive and negative impacts of government roles in collaboration.

This dissertation examines the watershed approach reform strategies state agencies have used to enhance public participation and stakeholder collaboration in watershed management activities.

### Adaptive Management

*“The first step to knowledge is the confession to ignorance.” (Weinburg, 1975)*

Sharing a common foundation with ecosystem management, adaptive management represents a unique strand of reform theory emphasizing the dynamic, uncertain nature of ecosystems and human impacts on them. Adaptive management focuses on the need for an experimental approach to management that maximizes

learning and adapts readily to new scientific knowledge, changing environmental conditions, and shifting social objectives (NRC, 2004). Despite its theoretical appeal and rhetorical embrace by many agencies, adaptive management has faced significant barriers in practical implementation. This section highlights some key principles and dilemmas of adaptive management relevant to agency implementation, from the growing body of literature on this reform (see Stankey, Clark, & Boorman, 2005 for an excellent comprehensive review).

With conceptual roots and linkages acknowledged in multiple natural and social science disciplines, adaptive environmental management was first articulated and elaborated in the seminal work of systems ecologists Holling (1978) and Walters (1986). Their scholarship with colleagues over the years has demonstrated that ecological-social systems often function in dynamic, non-linear, unpredictable ways where uncertainty and surprise are more often the norm than the exception (Gunderson, Holling, & Light, 1995). They argue that typical natural resource management, which focuses on predicting and controlling nature to produce a steady stream of human benefits, has undermined the resilience of environmental and social systems to respond effectively to change and disturbance. To better engage with this inherent uncertainty, they recommend a structured, experimental planning and implementation process that maximizes scientific learning and readily incorporates new knowledge to improve future management. These principles were tested in practice in several notable adaptive ecosystem management initiatives in the 1990s, including ecological restoration efforts in the Columbia and Colorado River basins, the Florida Everglades, and in the Northwest Forest Plan to balance forestry and endangered species issues (Gunderson & Light, 2006; Lee, 1993; Stankey et al., 2003).

Although interpretations of adaptive management have varied widely, a National Research Council report identifies six common elements from the literature (NRC, 2004). At the heart of adaptive management is a flexible, iterative decision process with *management objectives that are regularly revisited and accordingly revised* based on

changing knowledge, conditions, and societal needs. This decision process typically begins with using available scientific and socioeconomic information to develop a conceptual, often statistical, *model of the system being managed*. Rather than claiming to be a fairly certain depiction of reality, the model illustrates the baseline understanding and information gaps to be built upon through the adaptive management process. Recognizing the uncertainty inherent in identifying the “best” way to achieve management objectives, a *range of management choices* are explored in the modeling and planning process. Selecting management strategies involves a blending of science and social values, so adaptive management demands a *collaborative structure for stakeholder participation and learning*. Once management strategies are selected and implemented, *monitoring and evaluation of outcomes* is critical for testing and refining the system model and management strategies. Thus, to capitalize on the feedback from monitoring efforts, adaptive management requires an explicit *mechanism for incorporating learning into future decisions* and denotes a cyclical process over time (see, for example, Figure 1).

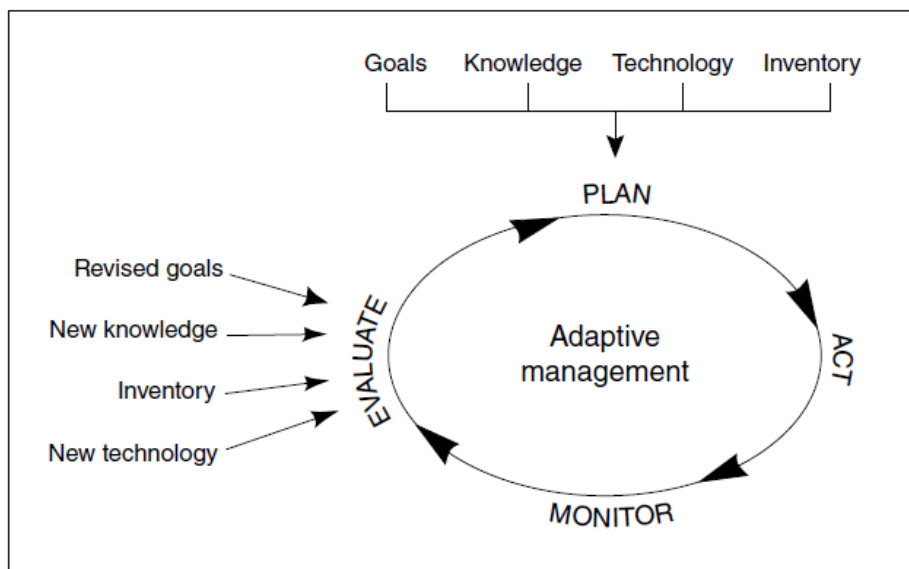


Figure 1. The adaptive management cycle (Source: USDA USDI 1994, E-14)..

The shorthand definition often used for adaptive management is “learning by doing” (Walters & Holling, 1990). As many have noted, there is nothing new about the concept of humans learning from the successes and failures of their actions and modifying strategies to achieve better outcomes. This random, unstructured trial and error process has been termed “evolutionary learning” (Walters & Holling, 1990). Adaptive management aims for a more deliberate, structured process of learning by doing that is rooted in the scientific method. In passive adaptive management, available knowledge is used to generate a best predicted strategy for meeting a given objective, and then implementation is carefully monitored and adjusted in accordance with the findings. This holds clear advantages over trial-and-error decision methods, because the management action is based on the best available science – with uncertainties clearly acknowledged – and the directed monitoring of outcomes helps to refine science and management decisions more quickly. Active adaptive management goes a step further, with management actions structured as experiments in the field to test alternative hypotheses about how the system operates and will respond to various human interventions.

Although adaptive management theory tends to focus heavily on scientific techniques, many have recognized that an effective social learning process among stakeholders is critical for its success (Lee, 1993; McLain & Lee, 1996). While science plays a central role, the process of deliberating over goals and management alternatives is essentially a political and civic one. McClain and Lee (1996) offer a critical perspective on adaptive management approaches that overemphasize scientific and technical dimensions and downplay the “value- and perspective-laden” aspects of ecosystem problems. They point to the need for inclusive policy processes that extend beyond core scientists and managers to build shared understandings among the diverse range of stakeholders needed to support implementation. Adaptive management has been applied to contentious decision arenas as a means for building this common scientific understanding. However, failed attempts in high conflict arenas suggest that a basic level

of agreement and buy-in on common objectives is a prerequisite for adaptive management (Feldman, 2008; Lee, 1999).

The significant political and institutional challenges of moving from adaptive management theory to actual implementation have been discussed by many (Allan, Curtis, Stankey & Shindler, 2008; Feldman 2008; Gunderson & Light, 2006; Lee, 1999; Walters, 1997). Drawing on firsthand experience with a structured experimental approach in the Columbia River basin and knowledge of other efforts, Lee (1999) concluded “adaptive management has been more influential, so far, as an idea than as a practical means of gaining insight into the behavior of ecosystems utilized and inhabited by humans” (para.1). Walters (1997) notes that of the 25 adaptive management planning exercises in which he had participated, only seven resulted in large-scale management experiments and only two had well planned statistical designs for testing hypotheses. The barriers to adaptive management frequently cited relate to the substantial costs and perceived risks associated with implementing large-scale experiments. Adaptive management efforts in the Everglades and Columbia River Basin have been constrained by the risk-averse nature of the Endangered Species Act, as well as resistance from environmental and economic stakeholders who collectively favor the status quo over novel management techniques with uncertain outcomes (Gunderson & Light, 2006; Lee, 1993; Walters, 1997).

Of the various components of ecosystem management, adaptive management has been particularly difficult for government agencies to put into practice for a number of reasons (Allan & Curtis, 2005; Butler & Koontz, 2005). On a practical level, with decreasing budgets and relatively short-term planning horizons, agencies have lacked the resources needed to sustain long-term monitoring and adaptive management efforts (Stankey et al., 2003) However, many of the impediments to adaptive management derive from long-standing norms in agency culture. There has been a strong tendency in agencies to avoid risk and failure, fueled by accountability mechanisms, legal requirements, and bureaucratic norms that favor control, precision, and predictable



outcomes (Allan et al., 2008; Holling & Meffe, 1996; NRC, 2004). Within the strong technical orientation of agencies, “errors are seen as the result of shortcomings, incompetence and poor planning, rather than an inevitable result of working in the face of complexity and uncertainty” (Allan et al., 2008, p. 169). Furthermore, the drive to “keep moving” towards meeting program targets and to sell program accomplishments are examples of the cultural imperatives in agencies that undermine active reflection and critical evaluation to learn from and improve implementation (Allan & Curtis, 2005). Adaptive management, which embraces uncertainty, surprise, and even mistakes for the valuable learning they provide, represents a “radical departure” from agency management norms (Allan et al., 2008).

In order to move adaptive management from its status as a fashionable buzzword to a meaningful reform strategy, important questions need to be addressed regarding how agencies can operationalize its principles within specific contexts and institutional constraints. Studies of agency manager perspectives reveal that there is still considerable confusion, ambiguity, and divergent interpretations of what adaptive management means and what it entails (Allan & Curtis, 2003; Stankey, 2003). Some agency managers resist the need for significant reform claiming that they “already manage adaptively” or “always learn from experience” (Allan & Curtis, 2005) This indicates a tendency to interpret “learning by doing” as simple trial and error learning rather than the deliberate, structured, experimental approach called for in adaptive management theory.

Resource managers have expressed the need for more explicit guidance on the range of adaptive management strategies available and the contextual considerations in how and when to apply them (Allan & Curtis, 2003). The National Research Council took an important step in this direction, providing an excellent review of the opportunities and challenges facing the US Army Corps of Engineers in integrating adaptive management principles into their water resources project planning (NRC, 2004). Gregory, Ohlson, and Arvai (2006) provide useful criteria for assessing the appropriateness of passive and active management strategies using factors such as

temporal and spatial scale, dimensions of uncertainty, institutional and stakeholder support, and evaluation of costs and benefits. Operational guidance and training, as well as institutional support for needed changes in agency culture, will be critical in order for agencies to move beyond rhetoric and realize the true learning benefit of adaptive reforms.

In summary, adaptive management addresses the need for a radical shift in environmental management to better anticipate and respond to uncertainty, surprise, and ongoing changes in knowledge, environmental conditions, and societal needs. It employs an iterative decision process that uses modeling to assess management alternatives and probe uncertainties; implements policies as monitored experiments; and readily adjusts management strategies based on new knowledge. A deliberate, structured process of “learning by doing” through passive or active adaptive management strategies improves on the random, less reliable trial and error learning typical in management agencies. While science is central to adaptive management, an effective social learning process is critical to generate common understanding and management direction among diverse stakeholders. Despite its theoretical appeal, the implementation success of adaptive management has been significantly hampered by risk-averse policies, stakeholders, and agencies; learning-resistant agency cultures; inadequate resources and leadership; and contentious political decision arenas lacking the requisite common agreement on management objectives. Research and practical guidance are needed on how adaptive management principles can be effectively implemented within particular agency contexts and constraints.

This dissertation explores how state agencies have interpreted and applied adaptive management in their watershed approach reform strategies, where applicable, and relates findings to principles and dilemmas in adaptive management literature.

#### Results-Oriented Management

*“In the next century, environmental protection must be driven by clear and measurable national goals...Performance will be measured by achieving real results in the real world, not simply adhering to procedures.” (Clinton & Gore, 1995)*

The 1990s were the decade of results- and performance-based reforms in government, prompted in part by the influential book *Reinventing Government* (Osborne & Gaebler, 1993). Reform arguments of the time focused on the inefficiency and ineffectiveness of the governmental bureaucracy and sought solutions in applying private sector principles to public agencies. The Clinton administration launched the National Performance Review of the federal government in 1993, embracing a suite of “reinvention” principles such as cutting bureaucratic red tape, reducing costs through competition and contracting, promoting flexibility and innovation, and holding agencies accountable for results (National Performance Review, 1993). The Government Performance Results Act of 1993 required federal agencies to generate five-year strategic plans, annual performance plans, and accountability reports that would track progress towards achieving societal outcomes. In theory, an agency’s results would be linked to resource allocation decisions to create a strong driver for high performance. The push for results-oriented management affected all agencies and policy areas, including the EPA and environmental management.

As part of the National Performance Review process, the Clinton administration issued in 1995 a multi-faceted strategy to improve environmental regulation, stressing their commitment to “reinventing environmental protection so that it will protect more and cost less” (Clinton & Gore, 1995). The report highlighted the unsolved problems and lessons learned from decades of predominantly command-and-control regulation at EPA. It outlined 10 principles for reinventing environmental regulation and 25 high priority actions which “demonstrate our commitment to providing flexibility, sparking innovation, and requiring accountability; to cutting red tape; to encouraging collaboration; and to focusing upon achieving environmental results in local communities, rather than adherence to bureaucratic procedures in Washington” (Clinton & Gore, 1995).

Two key reinvention initiatives pursued at EPA aimed to offer greater regulatory flexibility in exchange for enhanced environmental performance commitments: Project XL geared towards private industry and the National Environmental Performance Partnership System targeted to state agencies (NAPA, 1997). These early reinvention efforts were evaluated, along with an extended elaboration of the principles and strategies needed to enable results-oriented management at EPA, in a series of reports by a panel of the National Academy of Public Administration (NAPA, 1995, 1997, 2000).

Although straightforward in rationale, results-oriented management reflects a significant departure from the dominant approach to measuring agency accountability in terms of programmatic activities or “outputs” (Paddock & Keiner, 2000; Gormley, 2000). Program output measures, such as number of permits issued, inspections conducted, or grants disbursed, have been the primary accountability mechanism for EPA and the state agencies it oversees. Outputs are relatively easy to measure and cover activities directly within the agency’s control. However, it has been argued that outputs are not a good measure of whether actual environmental improvement is occurring as a result of agency actions. At their worst, output measures can drive agencies to absorb critical resources in bureaucratic “bean-counting” exercises and procedural requirements rather than meaningful action to address problems. Results-oriented reforms emphasize shifting the focus of management from outputs to the targeted societal and environmental outcomes, and evaluating agency performance based on these desirable, yet often more difficult to quantify and achieve, outcome goals.

Strategic planning to set outcome-focused objectives and operational strategies provides the critical direction for results-oriented management. The Government Performance Results Act (1993) required all federal agencies to create 5-year strategic plans, updated every 3 years, which link longer term agency objectives to the goals set forth in required annual performance plans. The National Academy of Public Administration panel assessed that the fragmented media-based statutory authority and other political and legal drivers cause EPA to be pulled in all directions at once, diluting

effectiveness (NAPA, 1995). The panel highlights the need for setting strategic priorities according to risk and other factors, so that resources can be focused on making progress on critical problems. In theory, strategic planning aims to achieve this by setting agency-wide priorities with clear, measurable outcomes targets and operational strategies which are then supported through a performance management system of planning, budgeting, and measuring and reporting on results.

Another key tenet of results-oriented environmental management is affording regulated entities more flexibility and discretion in designing cost-effective strategies to meet environmental targets. EPA has long been critiqued for imposing overly rigid and prescriptive one-size-fits-all technological standards on regulated industries that end up being economically inefficient and can stifle innovation (Fiorino, 2006). Market-based policy tools such as cap-and-trade programs for air emissions have been effective at achieving overall pollutant reductions at a significantly lower cost than traditional regulation alone (Kerr, Anderson & Jaksch, 2000). It has been suggested and demonstrated to a limited degree that applying similar trading principles to point source dischargers and/or nonpoint sources in a watershed could yield similar cost effective pollutant load reductions. However, there are many context-specific policy design considerations to be examined in determining whether pollutant trading will be appropriate and effective in a given area (NAPA, 2000; EPA, 2004)

Shifting from an administrative output to an environmental outcome focus has been difficult for EPA, due to a number of technical, political and administrative challenges (Gormley, 2000; Government Accountability Office [GAO], 1997; Paddock & Keiner, 2000). Performance management depends on robust, reliable data that track meaningful indicators of environmental or societal improvement, preferably data that demonstrate “impacts”, the linkage of agency actions to those improvements. EPA and states are still a long way from having this reliable performance data, although they have taken some steps to streamline their fragmented data infrastructure and to improve consistency in monitoring and reporting (GAO, 1997). However, even if good

environmental indicators and reliable data were readily available, many challenges and complexities can confound efforts to link agency management actions with changes in environmental conditions. Changes in environmental indicators can be influenced by a range of ecological dynamics, human influences, and time lags, making it difficult to isolate the positive or negative role of agency management actions (Knapp & Kim, 1998). It has been argued that using intermediate outcomes and more meaningful output measures, such as the extent of riparian buffer restored, may be needed as important proxies of agency performance, in addition to long-term tracking of environmental outcomes (Born & Genskow, 2000).

In addition to the many technical difficulties of devising good measures and developing the supporting data infrastructure, results-oriented management faces political and institutional challenges. EPA can set national performance goals in alignment with its statutory mandates, but it must work in a cooperative relationship with states and other agencies to work towards these goals (Scheberle, 2004). State environmental agencies are the primary implementers of most federal policies, and they are accountable both to EPA and to state level authorities that set policy and allocate resources. Priorities and accountability expectations can and often do differ among EPA, state and local authorities, and the interest groups who compete to shape environmental policy and management. Radin (2006) notes the difficulty of applying performance management principles to the public sector “where the complexity of public action frequently involves a range of actors with different agendas and conflicting values operating within a fragmented decision process.” Furthermore, agency staff must buy into the principles and strategies of performance management for it to be meaningful and effective. Agency managers may resist results-oriented reforms because they feel that they are unfairly held accountable for environmental outcomes beyond their authority and control, or feel threatened by how performance results might affect their budget, salary, or other factors (Gormley, 2000).

In summary, despite the implementation challenges and critiques, a focus on results-oriented management strategies has persisted at the federal level and continues to shape agency reform efforts at all levels of government. Key principles relevant to environmental governance are strategic planning to target resources to priority problems and goals; shifting the management focus from administrative outputs to environmental outcomes; providing regulatory flexibility in exchange for performance; and emphasizing cost-effectiveness and market-based policy tools. EPA and states face many challenges in developing the necessary outcomes indicators, data infrastructure, intergovernmental cooperation, and agency staff buy-in to support results-oriented management.

The results-oriented reform dimension was added to the conceptual framework for this dissertation because its principles emerged strongly in the early phases of research on watershed approach reform strategies at EPA, particularly those of EPA Region 4. This dissertation explores results-oriented reform issues such as strategic planning and results tracking, watershed prioritization and targeting, and market-oriented trading programs where they emerge in the EPA context (Chapter 4) and state agency case studies.

#### Cross-Reform Discussion

The key principles, issues and institutional challenges for each environmental governance reform dimension are synthesized in Figure 2. Despite the unique attributes of each dimension, the reforms share a number of commonalities. They all aim to improve on the inadequacies of top-down, command-and-control, bureaucratic environmental management for addressing persistent, complex sustainability challenges. To varying degrees, they have all faced difficulties in moving beyond buzzword status and rhetorical embrace to be implemented in meaningful, substantial ways by agencies. When attempted by agencies, the reforms are constrained by the same dysfunctional attributes of “the system” that they aim to transform. Durant et al. (1994) recognize the “Herculean task that reformers face in challenging a highly bureaucratized, inflexible, and hyperfragmented [environmental] governance regime” that persists into the 21<sup>st</sup> century (p. 6). Given the considerable barriers and implementation gaps discussed, this

| <b>Reform</b>                                                                                                                                                                               | <b>Principles</b>                                                                                                                                                                                                         | <b>Challenges</b>                                                                                                                                                                        | <b>Questions/Issues</b>                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Integrated Management</b><br><u>Problem:</u><br>Institutional fragmentation undermines sustainable management of ecological systems                                                      | Manage at ecological system scale (ecosystem/ watershed)<br><br>Address comprehensive scope of issues and their interconnections<br><br>Use coordination mechanisms across programs, policies, actors                     | Fragmented policies and programs<br><br>Mismatch of ecological and political boundaries<br><br>Agency preferences for functional specialization and reducing complexity                  | What ecological scale is effective and feasible? (basin, sub-watershed, etc.)<br><br>What scope of issues and objectives can be managed?<br><br>How to coordinate across jurisdictions/ programs/agencies? |
| <b>Collaborative Management</b><br><u>Problem:</u><br>Top-down agency-driven management does not support collective civic action needed for cross-jurisdictional, conflict-laden problems   | Use substantive, inclusive participation mechanisms in agency decision making<br><br>Support effective collaboration among agencies, stakeholders, scientists                                                             | Lack of meaningful, deliberative venues for participation<br><br>Time/resource-intensive process, often conflict-laden<br><br>Agency competition/ resistance to open decision processes  | What participation mechanisms to use? (how inclusive, passive/active, etc; what are costs and benefits?)<br><br>What role should agency play? (leader, encourager, follower, etc)                          |
| <b>Adaptive Management</b><br><u>Problem:</u><br>Deterministic, control-oriented management undermines resilience and learning needed to manage uncertain, dynamic ecological systems       | Use structured process of scientific, social learning to better manage uncertainty<br><br>Design/implement management actions as monitored experiments<br><br>Adjust management based on new knowledge, conditions, needs | Risk-averse agencies, policies, stakeholders<br><br>Resource demands of monitoring/ experimentation<br><br>Agency bias for action over learning; predictable outcomes over experiments   | How to define, interpret, use in different contexts? (passive/active etc)<br><br>How much conflict, risk, uncertainty is involved?<br><br>How to support monitoring, social learning processes?            |
| <b>Results-oriented Management</b><br><u>Problem:</u><br>Prescriptive, procedure-focused bureaucratic management is inefficient and ineffective in producing desired environmental outcomes | Use strategic planning, prioritization to target resources to outcomes<br><br>Shift accountability from outputs to outcomes; monitor/track outcomes<br><br>Use cost-effective, flexible, and market-based strategies      | Predominance of output/procedural focus in agencies<br><br>Environmental results difficult to measure and achieve<br><br>Mixed accountability (e.g. federal/state, different priorities) | How to balance legal/ programmatic accountability with outcomes focus?<br><br>How to monitor and quantify results?<br><br>How to agree on priority outcomes? (federal/state/local)                         |

*Figure 2. Dimensions of environmental governance reform.*



dissertation addresses the need for empirically grounded research on agency reform processes, operational strategies, and the contextual considerations that influence reform outcomes (Grumbine, 1997; Imperial, 1999)

As noted earlier, reform frameworks like ecosystem management and the watershed approach tend to be ambitious and idealistic, calling for change along all dimensions at once. While commonalities among the reform dimensions have been noted, how do the unique emphases and strategies of each dimension relate to those of the other dimensions? Are they mutually supportive and synergistic or do they pull agencies in different directions? The following discussion begins to explore the conceptual connections among the reform dimensions, which will be further developed using the study findings in the concluding chapter of the dissertation.

The dimensions of reform with most congruence and overlap are integrated and collaborative management. In this study, the integrated dimension focuses on what scope of scientific and programmatic issues are better coordinated at a watershed scale, while the collaborative dimension focuses on the public participation and stakeholder collaboration mechanisms that support integration. Possible tensions between the two dimensions relate to the extent to which the management process is more top-down and agency driven or more bottom-up and community/stakeholder driven. To paint it in simplified terms, agency driven processes may be able to achieve more robust integrated science and coordination across programmatic divisions, but the rational planning processes typically used may not be as accessible, inclusive, or receptive to broad stakeholder participation. Bottom-up community driven collaborations, on the other hand, may not have the capacity or interest to incorporate a comprehensive range of ecological and social issues and engage all the governmental authorities needed to change management policies and practices. Agency reforms that focus on both the integrated and collaborative dimensions at once may yield a more productive balance bridging the strengths of top-down and bottom-up decision processes.

Adaptive management also ties in closely with the integrated and collaborative dimensions. Integrated management at an ecosystem or watershed scale can be seen as a prerequisite for adaptive management which requires a systems-level focus. Adaptive management contributes unique strategies to an integrated management effort, including an explicit embrace of uncertainty, learning, experimentation, and a flexible management regime that adjusts readily to new knowledge and needs. The collaborative reform dimension, or extent of stakeholder collaboration and participation, relates directly to the social learning process that many argue is vital to move adaptive management beyond the limited domain of scientists and resource managers. Adaptive management faces all the institutional challenges of integrated and collaborative management, plus additional hurdles related to the risk-averse, inflexible, and learning-resistant tendencies of bureaucracies and agency cultures. The intensive investment necessary and institutional change to actualize active adaptive ecosystem management as portrayed in the literature may limit its adoption to particular contexts where the costs of uncertainty and the buy-in among agencies and stakeholders are high. Passive adaptive management strategies, while not harnessing the full learning potential of active experimentation, may be more feasible in a wider range of agency contexts and constitute an improvement over typical unstructured trial and error learning.

Results-oriented management is in some ways the oddball of the four reform dimensions. It has been the dominant concern of public administration scholars focused on reinvention reforms at EPA and the states but rarely appears as an emphasis in the literature on integrated, adaptive, and collaborative management. Results-oriented environmental reforms target some of the same bureaucratic problems as the other reforms (ineffectiveness in achieving environmental goals, inflexible policies and procedures), but it departs from them in its dominant emphasis on cost-effectiveness, prioritization, and agency accountability mechanisms. Steps in the direction of more integrated, collaborative, and adaptive management – while aiming to be more effective in addressing environmental problems in the long-term – tend to increase the complexity

of decision making and demand more resources and time. A results-orientation may help focus and drive action in the other reform dimensions that can get bogged down in process. However, the concern for cost-effectiveness and delivery of measurable results may often sit at odds with the comprehensive, deliberative, social learning emphases of the other reforms. For example, while both results-oriented and adaptive management feature an iterative planning-implementation-monitoring-evaluation decision cycle, the former expects predictable, quantitative environmental improvements while the latter embraces uncertainty, learning for learning's sake, and the knowledge-generating value of management surprises and "failures."

This brief review suggests several areas of possible synergy and tension among the reform dimensions that will be important to consider in looking at the operational strategies agencies have used to implement the watershed approach reform framework. Given that many environmental agencies face expanding management responsibilities and shrinking budgets, it can be anticipated that they will be selective and strategic in implementing reform strategies. Some may focus more on integration, others more on managing for environmental results. Durant et al. (2004) query, "is it possible that these [environmental governance] reforms are more or less likely to be effective under differing circumstances, with different strategies, and in conjunction with other tactics?" (p.8). These strategic choices to pursue some reform principles and not others will likely reflect attributes of the agency's context, mission and goals, management culture, funding, and other factors. These contextual considerations form the focus of the final section of this chapter.

### **2.3 Conceptual Framework: Reform Implementation within an Environmental Federalism Context**

The focus of this section shifts from general reform implementation challenges for agencies to the specific institutional context for this study: environmental federalism. Many of the environmental laws passed in the 1970s employed a "cooperative federalism" implementation structure, with authorities and responsibilities divided

between the federal EPA and state agencies. Prior to that time, pollution control had been mostly a matter of state authority, but the extent of environmental problems and public concern by the late 1960s prompted policymakers to centralize major new authorities at the federal level. The EPA was given responsibility for establishing national standards, regulations, and programs to implement federal statutes like the Clean Water Act. State agencies were charged with most of the day-to-day implementation of these policies and programs, provided that they sought and met EPA's criteria for "primacy." EPA retained oversight authority, with tools to influence state agency implementation varying in degree of coerciveness.

While state pollution control agencies were considered by many to be weak and ineffective when the federal statutes were passed, since that time their capacity to manage robust environmental programs has increased significantly. Early studies of state environmental policy proposed a "race to the bottom" wherein economic competition among states to attract industry promoted lax environmental policies and weak regulatory agencies. As state environmental programs have matured, expanding in size, breadth of responsibility, and technical sophistication, the role of states as critical "laboratories of innovation" has been explored (Sapat, 2005). In recent years, states have led the way in pursuing climate change policies, while the federal government has stalled (Rabe, 2007). These positive examples support arguments for increased devolution of policy authority from federal to state and local levels, a trend which has been occurring in many policy arenas since the early 1980s. Proponents of devolution suggest that state and local governments can devise more effective policy solutions than federal policymakers in Washington, as they are closer to the problems and the affected communities, and they have fewer layers of administrative reform through which to go. However, some caution that state environmental programs still vary widely in strength and capacity; shifting more responsibility onto underfunded state agencies on the weaker end of the spectrum could be counterproductive (Hoornbeek, 2005; Rabe, 2006)

As environmental policy responsibilities have burgeoned in scope and complexity for federal and state agencies alike, without corresponding increases in federal resource allocation, intergovernmental relationships have grown increasingly strained (Scheberle, 2004). Key issues at the center of many federal-state conflicts include:

...the adequacy of federal financial assistance, the extent of federal 'micromanagement' of state programs, and the degree to which states are given flexibility to set policy priorities reflecting problems of local importance (Kraft & Scheberle, 1998, p. 134)

During the reinventing government reforms of the 1990s, arguments were made for substantially improving intergovernmental relationships and efforts were initiated in this direction (GAO, 1995). The National Environmental Performance Partnership System aimed to increase states' flexibility, discretion, and innovation opportunities in exchange for performance accountability agreements. However, the reform initiative fell short of hopes and expectations on a number of accounts and did not resolve the pervasive, underlying tensions in intergovernmental relations (Scheberle, 2004).

The environmental federalism context, while heavy with the institutional impediments to reform discussed above, remains the dominant vehicle of policy implementation in our country, making the need and opportunity for change all the more compelling. States hold promise as laboratories of innovation because they have the ability to pass progressive policies and management reforms beyond what has been possible at the federal level. However, the strength of state policy implementation can be linked to a number of contextual factors, such as the severity and nature of environmental problems, economic resources of states, and political culture (Lester & Lombard, 1990; Ringquist, 1993). Moreover, state agency reform efforts are supplemental to the primary responsibilities they hold for implementing the mandates and programs required by federal and state law. EPA's policies, funding, program management, and state oversight may play varying roles in facilitating or constraining reform, though states would probably argue that the latter is more common.

To understand a state agency's prospects for and process of reform implementation, a holistic appreciation of the constellation of federal and state contextual influences is needed. This study draws on a useful model of policy implementation within the environmental federalism context developed by Scheberle (2004) based on years of empirical research on the subject (Figure 3). The model depicts the major extrinsic, or contextual, factors beyond the agency's control that can influence policy implementation. It also includes intrinsic factors, those within the agency's operation or discretion that can shape agency implementation outputs and resulting policy outcomes. Figure 4 portrays the conceptual framework developed for this study, modified from Scheberle, to understand agency reform processes within the context of environmental federalism.

#### Environmental Federalism Context

The context component of the conceptual framework, simplified from Scheberle's model for the purpose of this study, addresses Research Question 2:

#### **What contextual factors at the federal and state level helped to shape state agency reform strategies?**

As Scheberle's model depicts, the outputs and outcomes of policy implementation within environmental federalism are influenced by a variety of contextual or "extrinsic" factors. Much of the work of state environmental agencies is necessarily driven and structured by the statutory, regulatory, and programmatic requirements of federal policies like the Clean Water Act and the oversight direction from EPA. Since state programs often parallel those of EPA, it is likely that EPA's reform guidance and strategies will inform state reform strategies, particularly where there is funding or other incentives attached. While many national policy and program decisions are made at EPA headquarters, the 10 EPA regional offices work directly with state agencies on how programs are implemented. Thus, although states share a similar national policy context, EPA's influence on state reform efforts may vary depending on EPA regional office leadership, priorities, program oversight, and the quality of intergovernmental working relationships (Scheberle, 2004).

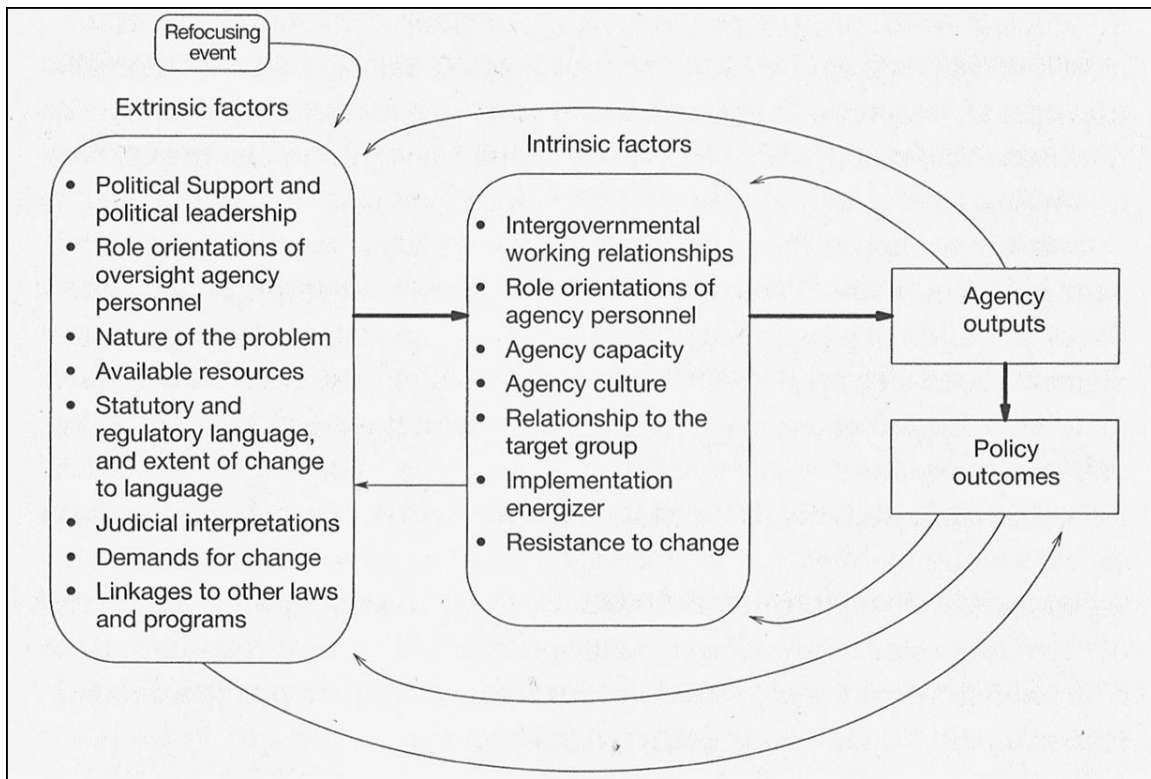


Figure 3. Scheberle's model (2004) of the extrinsic and intrinsic factors that shape agency outputs and policy outcomes.

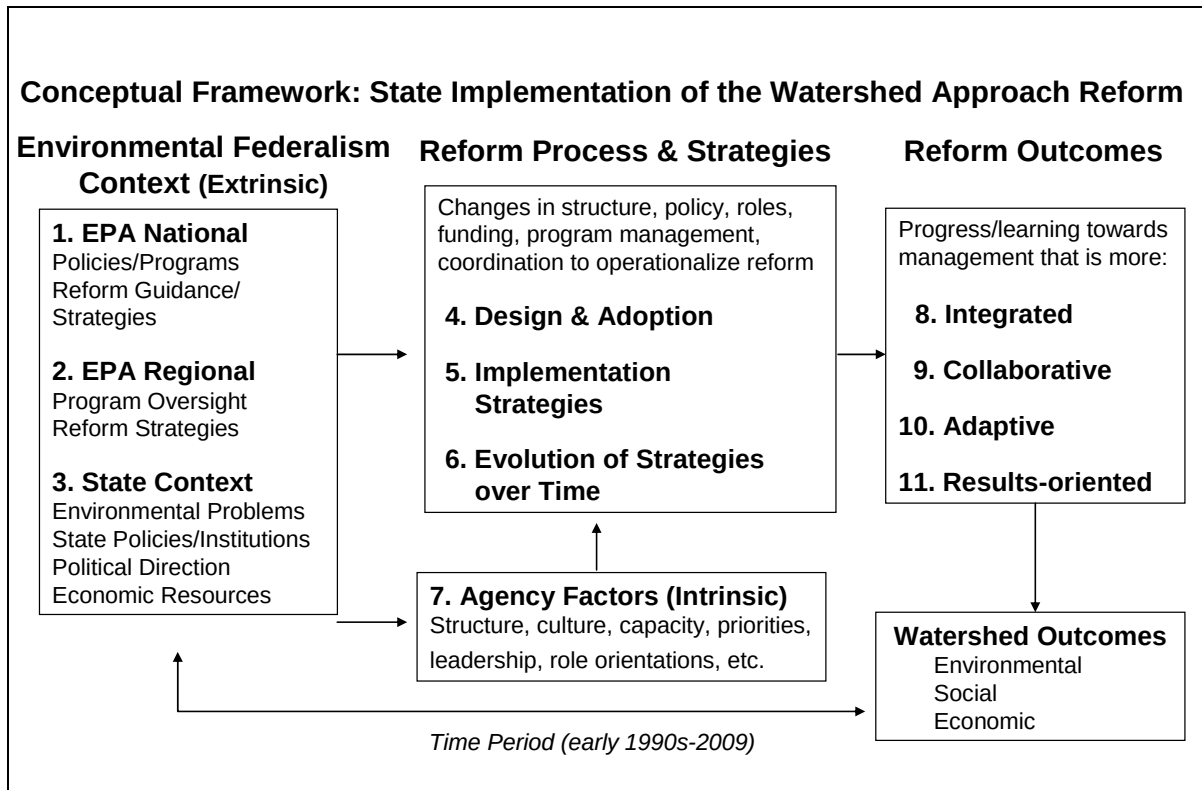


*Figure 4. Conceptual framework for this dissertation, adapted from Scheberle (2004).*



Reforms such as the watershed approach are not mandatory policies but rather voluntary principles and strategies for how agencies might manage resources more effectively to address problems. Since they are not federally mandated, such innovations may be more likely to emerge at the state level in a bottom up manner in response to state and local priorities, rather than in a top down model following EPA's lead. Agency implementation may be strongly influenced by state level factors such as the nature and severity of environmental problems, the economic resources devoted to environmental programs, political direction from executive and legislative branch leadership, and public or interest group demands (Lester & Lombard 1990, Ringquist 1993). In addition, the priorities and reform strategies of individual agencies may be shaped by state-specific policies and the unique configuration of authorities and programs across various institutions in the state. For example, the water quality agency might play less of a leadership role in watershed approach reforms in a state with an interagency executive commission dedicated to watershed management issues than in a state without such an entity.

#### Reform Process and Strategies

Working within this constellation of EPA and state level influences, agency managers still retain a considerable degree of discretion and influence over the priorities and implementation strategies of the agency. Agency leaders can pursue specific policy objectives through changes to organizational structure, internal policies, staff roles, resource allocation, and other mechanisms. They can establish or support processes of planning, coordination, and collaboration both within the agency and among external agencies and stakeholders. Reform strategies may be pursued from the top level down by agency leaders or they may be led by entrepreneurial managers at different levels or programs within the organization. At the same time, as illustrated in the reform literature, innovation may be significantly constrained by the role orientations of agency personnel and resistance to change, as well as other unsupportive aspects of agency culture. The conceptual framework proposes that agency reform strategies and outcomes will be

shaped by some combination of these agency level or “intrinsic” factors and the contextual factors at the EPA and state level discussed above.

This discretionary potential of agencies to forge innovative solutions amidst an array of forces outside of their control is of vital interest in this research. The central portion of the conceptual framework addresses Research Question 1:

**How have states operationalized the watershed approach reform through specific management strategies over time?**

The initial reform design and adoption process plays an important role in defining the policy goals and problems that the implementation strategies aim to address. In this step, general reform principles like “integrated management”, which can be interpreted in a variety of ways, become more explicitly defined through the policy guidance and organizational strategies adopted. From there, the truly fascinating process of implementation and adaptation proceeds, where reforms are tested in their institutional environment and modified in minor or major ways based on internal and external dynamics, as well as the new priorities, drivers and constraints that continually emerge over time. Thus, the implementation story of reform strategies and their evolution cannot be understood apart from the shifting influence of the extrinsic and intrinsic factors discussed above.

#### Reform Outcomes

The final component of the conceptual framework addresses Research Question 3, which has been the main focus of this chapter:

**What have been the reform outcomes in terms of progress towards more integrated, collaborative, adaptive and results-oriented management?**

In this study, it is assumed based on environmental governance reform theory that progress in these four reform dimensions represents an important intermediate outcome in the journey towards more sustainable watershed management outcomes. This is based in part on repeated arguments in the literature that the predominant obstacles to needed reforms are not scientific or technical, but rather social and institutional. Therefore this

aspect of the conceptual framework examines state reform strategies in terms of how they advance the four goals of integrated, collaborative, adaptive and results-based management. The “Dimensions of Environmental Governance Reform” framework (Figure 2) will serve as a conceptual reference, supplemented by analytical methods described in Chapter 3, for qualitatively assessing reform outcomes in this research and linking case findings to key issues in the reform literature.

#### Applying the Conceptual Framework

It was not possible in the scope of this study to give comprehensive treatment to each of the elements represented in the conceptual framework. Indeed, a significant research effort might involve in-depth study of only one or two facets of this framework. For example, Scheberle’s research, though it presents the holistic environmental federalism policy implementation model discussed here, focused more narrowly on the influence of one unstudied factor, intergovernmental relationships, in shaping policy outcomes. In this dissertation, as is detailed in the next chapter on research design and methods, the emphasis was on holistic description and exploratory analysis of the major concepts in this framework. The EPA national and regional policy context receives significant coverage in Chapter 4 and is revisited in the cross case analysis in Chapter 6. Reform process and strategies are described substantively in the state case studies, with a review of salient state policy context elements and only those agency (intrinsic) factors that emerged from the available case data. Reform outcomes in the four dimensions are discussed briefly in each case study but given substantial treatment in the cross-case analysis in Chapter 6. Assessing watershed outcomes (environmental, social, economic) was beyond the scope of this study, but issues regarding watershed outcomes that emerged in the cases were noted in the state case studies and cross case analysis.

## **Chapter 3: Research Design & Methods**

The purpose of this chapter is to describe the research design and methods that were employed in this study of state implementation of the watershed approach reform. The first section presents and provides a rationale for the multiple case study research design, case selection, and research objectives that are used to address the study's research questions. Subsequent sections describe the methods of data collection and analysis used to develop the national policy context (Chapter 4), the state case studies (Chapter 5), and the cross case analysis of findings (Chapter 6). Limitations of the study and steps taken to enhance the quality of findings are discussed in the concluding section.

### **3.1 Research Design**

This dissertation aims to understand the process of environmental governance reform within the context of agency constraints. Once state watershed approach implementation was identified as an arena ripe for further research, scoping interviews to inform research design were conducted with EPA evaluators who had done prior studies on the watershed approach. From these interviews, it was determined that an in-depth case study approach would yield more valuable information on the process of reform implementation over time than a survey-based approach to look at general trends across all states. This section presents the multiple case study design employed to answer the overarching research questions:

- 1. How have states operationalized the watershed approach reform through specific management strategies over time?**
- 2. What contextual factors at the federal and state level helped to shape state agency reform strategies?**
- 3. What have been the reform outcomes in terms of progress towards more integrated, collaborative, adaptive and results-oriented management?**

### Multiple Case Study Design

Case study is a long established methodology in public administration, environmental policy, and other disciplines. According to Yin (2009), “a case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context” (p. 18). Case study is an especially valuable methodology for generating holistic understanding of how a “bounded system” (i.e. the case) operates in relation to its multifaceted contextual setting (Stake, 1995). Although quantitative data and methods are sometimes used, the strength of case study in providing rich empirical description of complex phenomena often derives from a qualitative research approach focused on participants’ experiences within the case (Creswell, 1998; Stake 1995). The evolving, context-rich organizational processes of agency reform efforts are difficult to measure quantitatively but can be illumined well using a holistic case study design.

Case studies can be exploratory, descriptive or explanatory in nature depending on the nature of the research problem and questions (Yin, 2009). This study aims first to *describe* holistically the process of state watershed approach implementation within the environmental federalism context as a complex, evolving story over time. The study then *explores* salient connections among aspects of the environmental federalism context, state watershed approach strategies, and reform outcomes along the four reform theory dimensions of interest. Thus, it does not aim to *explain* or test causal relationships between context or process variables and outcomes, although the study’s exploratory findings could provide a strong foundation for future explanatory studies. The main theoretical contribution of the study lies in the conceptual framework applied to the case studies and used to link cross-case findings back to key reform principles and issues in the literature.

An important step in case study design is defining the boundaries of the case in time, space, and substantive focus and also determining the relevant context to describe (Stake, 1995; Yin, 2009). In this study, each case consists of a state water quality agency’s watershed management reform efforts, starting with the adoption of a statewide

watershed framework in the 1990s and covering major changes through autumn of 2009 when the case study visits were conducted. The substantive issues of focus in the case studies are reflected in the study's research objectives and conceptual framework discussed further below. The context of interest for the case studies focuses on environmental federalism dynamics, covered in two ways: 1) the EPA national and regional policy context for watershed approach reforms is first established to frame the state cases (Chapter 4), and 2) key aspects of the state policy context for watershed management reforms are discussed within each state case study.

A key characteristic and strength of case study methodology is the synthesis of multiple sources of evidence, which may include documents, archival records, interviews, direct observation, participant observation, and artifacts (Yin, 2009). Of these, the most appropriate for this study of agency implementation processes that have occurred over a number of years are document analysis (policy documents, program history, basin plans, etc.) and interviews with key agency participants. The use of multiple data sources and perspectives assists in triangulation of information to improve the validity of findings, as is discussed further below (Stake, 1995). Documents capture the formal record of policy design, implementation process, and outcomes, while interviews help to flesh out the human and institutional dynamics as experienced by participants in an evolving context. Since the research focuses primarily on what has happened in the past, direct observation in the field is not possible, though site visits for interviews will aid in appreciating the daily reality of agency staff and help build rapport with participants.

Although a single case study can yield rich, in-depth understanding of a particular case, examining multiple cases provides greater insight into how the phenomenon of interest operates in different contexts (Stake, 2006). A multiple case study should not be viewed as a "small-n" sample, using the sampling logic of quantitative research, because the aim of the methodology is not statistical generalization to a larger population (Yin, 2009). Rather, case studies can aid "analytic generalization" in which the empirical findings are compared with prior theory and research, with potential to confirm, expand,

or refine existing conceptualizations of the phenomenon of interest (Yin, 2009). In this study, examining multiple state cases using a common conceptual framework allows for a greater range of contextual factors, reform strategies, and outcomes to be explored and compared. According to Stake (1995), efforts towards generalization should be secondary to the primary aim and strength of case study research in “particularization” – developing a robust description and analysis of the uniqueness of each case and its context. Thus, in multiple case study research it is recommended that each case be comprehensively described and analyzed first, before attempting cross-case comparisons or generalizations (Stake, 2006).

#### Case Selection

In case study research design, cases are typically selected *purposively* to maximize learning about the research questions, in contrast to the quantitative ideal of a random sample that is statistically representative of a larger population (Patton, 2002; Yin, 2009). Early scoping interviews with key informants at EPA revealed that EPA Region 4 in the southeastern United States had been a leader in promoting watershed approach reforms at the national, regional, and state level over the last decade. In addition, while only about half of the nation’s states had adopted a statewide watershed approach framework as of 2002, all eight of the Region 4 state water quality agencies have done so. Therefore, the significant watershed approach efforts of Region 4 EPA and the states therein offer a good laboratory for learning about how environmental management reforms have played out in different state contexts.

Examining state watershed approach implementation within the same region of the country offers certain advantages relative to the study’s research questions. Preliminary research and scoping interviews for this study suggested that the considerable national variation in states’ institutional, political, economic, and environmental contexts, as well as differences in their programmatic structures and strategies, contribute to the significant complexity of describing and comparing state watershed approaches. For one example, water law differs greatly between eastern and

western states, with water quantity typically a stronger driver for watershed approaches in the west and water quality issues predominating in the east. Therefore, limiting the study to cases in the same region helped to reduce the dimensions of contextual variation somewhat, enabling a more fine grain analysis of the differences in state context, strategies and outcomes that exist even in a common regional setting (Blomquist et al., 2004). Furthermore, using a regional multi-case set enabled comparison of watershed approach strategies between EPA Region 4 and the states it oversees, which served the study's second research question on environmental federalism dynamics. It would have been difficult to adequately describe the complexity in state context and strategies, as well as examine the varying influence of different EPA regions' leadership, in the scope of one dissertation.

Balancing the desire for in-depth case analysis with time and resource constraints of the research project, three states in Region 4 were selected for case study: North Carolina, Georgia, and Kentucky. The states were selected based on background research and input from EPA Region 4 leaders to meet the criteria of *information-rich* cases and *diversity in context, strategy and outcomes* to maximize learning and theoretical significance. In 1991, North Carolina adopted the first basin planning framework in the country for managing water quality programs, which became a model for EPA and other states. The state has also been a leader in water quality trading and nonpoint source rules to address nutrients at a watershed scale. Georgia also adopted a basin planning framework in the early 1990s but has in recent years developed a new comprehensive state water planning process that integrates water quality and quantity management. In 1997, Kentucky adopted a multi-tiered collaborative watershed approach framework, with an interagency state steering committee, basin councils and coordinators, and local priority watershed initiatives. Although each state water quality agency has invested in some form of a watershed approach framework, their varying contextual drivers, resource levels, and implementation strategies provide a rich venue for exploring the study's research questions.



## Research Objectives

In order to address the study's overarching research questions, a set of substantive research objectives was developed to achieve a robust, holistic description of the national and regional policy context and the state case studies. These objectives provided a roadmap for data collection and analysis, guiding decisions on what documentary evidence to pursue and what information to gather in interviews. Figure 5 provides a visual overview of the major components of the research design. The specific data collection and analysis procedures utilized are described in subsequent sections of this chapter.

### *Research Objectives:*

#### 1. National & Regional Policy Context (Chapter 4)

- Summarize EPA's policy framework for state water quality management, including key Clean Water Act programs
- Review EPA's watershed approach guidance and implementation efforts from adoption in 1991 to time of data collection in 2007
- Summarize EPA Region 4's watershed approach implementation efforts
- Assess the EPA context for watershed approach implementation (national and regional) using the study's four reform dimensions of integrated, collaborative, adaptive, and results-oriented management

#### 2. State Case Studies (Chapter 5)

- Review the state policy context within each case, including key environmental, policy, and institutional factors that are relevant to watershed management in the state
- Summarize the agency's design and adoption of the initial watershed approach framework including the organizational changes required for implementation
- Describe the main implementation strategies that have been used to operationalize the watershed approach reform (e.g. coordination mechanisms, stakeholder involvement)
- Summarize the evolution of the state's watershed approach strategies, including changes to the initial framework, new strategies that emerged over time, and institutional challenges that have affected implementation
- Assess the reform outcomes of the state's watershed approach using the study's four dimensions of integrated, collaborative, adaptive, and results-oriented management

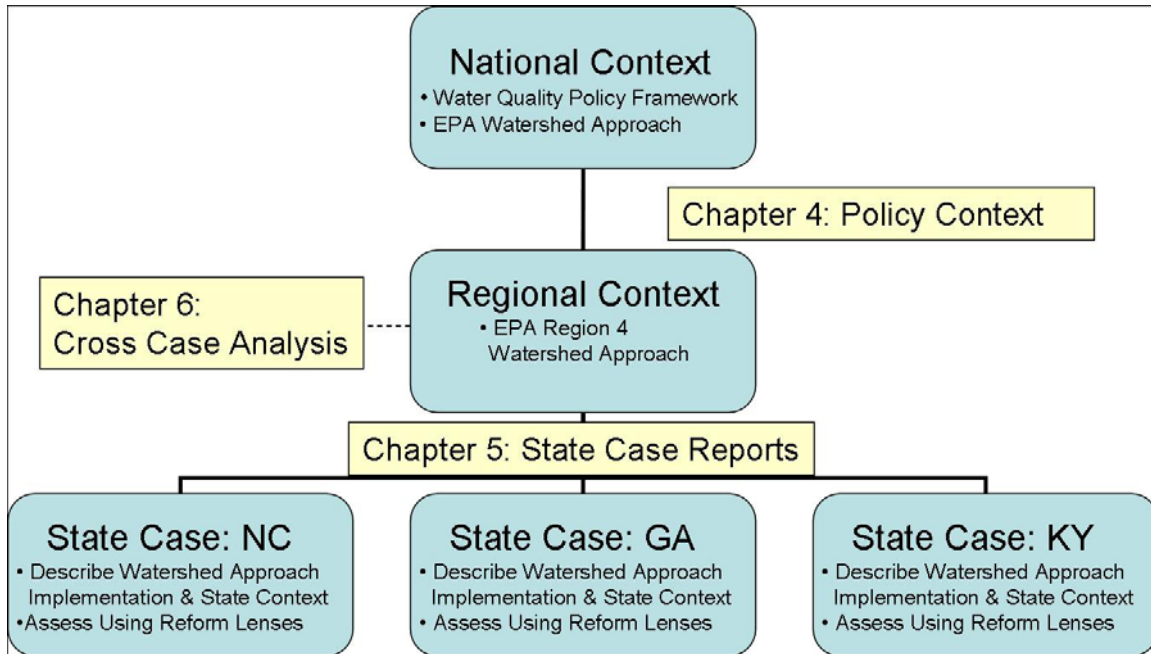


Figure 5. Overview of research design.

#### Research Objectives (cont.):

#### 3. Cross-Case Analysis/Discussion (Chapter 6)

- Synthesize and discuss findings regarding reform within the context of environmental federalism, summarizing the key EPA and state context factors that have helped to shape state watershed approach strategies over time (RQ2)
- Synthesize and discuss findings regarding the strategies states and EPA have used to operationalize the watershed approach (RQ1) and the reform outcomes of these strategies in the four dimensions of integrated, collaborative, adaptive, and results-oriented management (RQ3)
- Provide conclusions and recommendations regarding EPA and state agency watershed approach reforms, as well as suggestions for further research

### 3.2 Data Collection Methods

This section describes the methods used to carry out interviews and document collection for this multiple case study. Following the research design presented above, a two-stage approach to data collection was employed. First, the national policy context relevant to state watershed approach efforts was reviewed through policy and document analysis, supplemented by key informant interviews at EPA headquarters in November of

2007. As part of this national policy context, information and perspectives on EPA Region 4's watershed approach strategies were gathered through key informant interviews and document collection at EPA's Atlanta office in December of 2008. Second, interviews were conducted with agencies representing each case study, and relevant documents were also collected, in North Carolina, Georgia, and Kentucky during September-November 2009. As the cases were being analyzed and drafted, follow up calls and emails were made to agency contacts to gather additional case data as needed. In total, 45 semi-structured, in person interviews averaging one hour in length were conducted, audiorecorded, and transcribed following the procedures described below.

For each phase of data collection, steps were taken to gain access, permissions, and assistance from each agency to conduct the case study and onsite interviews. A primary contact person with a leadership role in the agency's watershed approach was established for each agency: EPA Headquarters Office of Wetlands, Oceans & Watersheds, EPA Region 4 Water Protection Division, North Carolina Division of Water Quality, Georgia Watershed Protection Branch, and Kentucky Division of Water. A preliminary phone interview was conducted with each primary contact to discuss and gain support for the project, obtain a historical overview of the agency's watershed approach, identify appropriate managers for interviews, and select dates for the site visit. For each state, approval to conduct the case study was also sought and obtained through email from the water quality agency's director. Each primary agency contact played a critical role in arranging the logistical details of site visits, assisting with interview scheduling, providing background information and documentation, and supporting agency managers to participate in the study.

#### Interview Methods

An important step in planning for the interviews involved addressing the ethical and confidentiality-protection issues surrounding research involving human subjects. Prior to data collection, the research procedures for conducting interviews, providing informed consent, and protecting participant confidentiality were submitted to and

approved by the University of Tennessee's Institutional Review Board. The approved informed consent form stated the purpose of the study, explained how interviews would be recorded and transcribed, and outlined steps to protect confidentiality (Appendix A). This form was sent by email with a summary of the research project to each agency manager invited to participate in an interview (Appendix B). At the beginning of each interview, the informed consent form was reviewed and two copies were signed by the participant and the researcher so that each would retain a copy of the agreement. To encourage candid sharing of perspectives and protect confidentiality of responses, participants were assured that any information or quotes cited in the research report would appear without names or personal identifying information. The researcher provided each participant an opportunity to review the draft case study report, suggest factual corrections and other edits, and make requests that particular sensitive information be taken "off record."

Following the "information-rich" criterion used for case selection, interview participants were selected purposively based on who had the most experience with the agency's watershed approach and could provide diverse perspectives on its implementation (Patton, 2002). Interview participants were identified using a combination of the input given by the primary agency contacts and a review of information online about the agency's organizational structure and watershed management programs. The interview approach, including participant selection and the interview guide of questions used, differed somewhat based on the phase of data collection as discussed below.

The EPA national context interviews took place early in the study and helped inform the subsequent research design. Since there was relatively significant documentation available on EPA's watershed approach, the interviews were designed as a secondary data source to confirm and supplement document sources, as well as to sensitize the researcher to EPA perspectives on state watershed approach implementation. The interviews were semi-structured following a general interview guide of topics with

flexibility to pursue topics relevant to each manager's unique watershed program experience (Patton, 2002; Appendix C). Seven onsite interviews were conducted at EPA Headquarters in Washington DC on November 14-15, 2007: four with managers in key watershed policy roles and three with managers in the watershed-related program areas that are described in Chapter 4. In addition, four informal information gathering phone interviews were conducted to further inform research design: two with EPA managers who had evaluated watershed approach implementation; one with the River Network, a national nonprofit capacity building organization serving watershed organizations; and one with the Association of State and Interstate Water Pollution Control Administrators, which provides national representation of state water quality agencies.

The second stage of data collection focused on gaining an overview of EPA Region 4's efforts to implement the watershed approach, including its work with the three case study states. Since there was no publicly available documentation on this topic, open-ended key informant interviews provided the primary data source, supplemented by several useful internal documents gathered onsite. Interviews were conducted during a site visit to the EPA Region 4 office in Atlanta on December 2-4, 2008. The interview participants included eight agency managers who had the most experience with EPA's watershed approach efforts in the region and with the case study states. The open-ended interviews did not follow an interview guide but focused on two main topics 1) EPA Region 4's organizational changes since 2003 to support the watershed approach in its internal operations and its work with states and local entities, and 2) gaining background on how the three case study states had implemented the watershed approach.

Once a better understanding of the national and regional policy context for state watershed approach implementation had been gained, the research design for the state case studies was further developed in several ways. The four reform dimensions of the conceptual framework were developed based on the context findings and additional literature review. A case study protocol based on the research objectives and conceptual framework was developed to ensure that a consistent methodology would be used for the

three state cases (Yin, 2009; Appendix D). For each state case, around 10 interview participants were selected with input from each state primary contact to reflect a mix of four perspectives: historical (adoption/early implementation), current basin-scale coordinators/managers, other program managers (eg. nonpoint source, TMDL), and one agency leader situated in the director's office. Because each state's watershed approach has a different structure and history of strategies, the aim was more to capture the best holistic coverage of the implementation story and less to replicate the exact configuration of manager roles sampled in each state. Multiple interview guide templates were developed to capture different information needs for these targeted participant perspectives (Appendix C).

Interviews conducted throughout the phases of the study followed the same general procedures. Interviews were approximately one hour in length, beginning with a review of the study's purpose and informed consent issues, moving through the interview guide topics and follow up questions, and ending with requests for documents as appropriate. All interviews were digitally audiorecorded with permission, with the exception of one EPA participant who preferred not to be recorded. Detailed interview notes were transcribed from the recordings in a manner that preserved the factual substance and word choices of the participants, with key quotes used in the analysis transcribed verbatim. A research assistant helped in transcribing the state case study interviews, with close review by the researcher to ensure that the substance of interviews was appropriately captured. To protect the confidentiality of participants, the digital recordings and interview transcripts were stored electronically on the researcher's password-protected computer without any personal identifying information using a numbering system only accessible to the researcher.

#### Document Collection

Documents, including the substantial information available on agency websites, were collected and reviewed throughout the course of the study. Ongoing document review prior to the case study visit helped prepare the researcher for useful lines of

inquiry and follow up questions for specific interview participants (Yin, 2009). Most of the documents reviewed for the national policy context analysis and the state case studies were identified through agency websites, cited references from various agency and research reports, and other topical internet searches. Documents served as the primary data source for the national policy context. The limited documentation available regarding EPA Region 4's watershed approach efforts was identified and obtained through the Atlanta site visit and follow up emails. State agency websites and documents provided a wealth of information for the case studies and were reviewed prior to site visits to select interview participants and identify state-specific topics and issues to be covered in interviews. Some additional internal agency documents, such as organizational charts, project documents, and internal reports were identified and obtained on state case study visits and through follow up emails after the interviews. An electronic filing system was used to store and organize all documents for easy access, including website text which was copied into Microsoft Word documents with associated website reference information.

### **3.3 Data Analysis Methods**

A systematic process of data analysis based on a blending of multiple case study methodology (Stake, 2006) and qualitative data analysis techniques (Miles & Huberman, 1994) was applied to the amassed set of document and interview data. As is common in qualitative research, some amount of data analysis occurred on an ongoing basis as data collection progressed, documents were reviewed, and interviews were conducted. Once the multi-case dataset was relatively complete, a more structured, iterative process of data analysis was employed to construct the national and regional policy context chapter, state case studies, and cross case discussion. The analysis focused on immersion in one unit of study at a time, following the sequence of national context, regional context, North Carolina, Georgia, and Kentucky before moving on to cross case analysis.

The first stage of analysis for each unit of study involved reading through the dataset of documents and interviews and taking notes on the preliminary "big ideas" to

gain a sense of the whole (Stake, 1995). Following the initial review, a qualitative coding procedure was used to assign text from interviews and document into descriptive and analytical categories (Corbin & Strauss, 2008). A preliminary coding scheme was developed prior to data collection based on the study’s conceptual framework (Miles & Huberman, 1994). The major categories of the conceptual framework and coding scheme are shown in Figure 6. Additional descriptive codes were added as coding progressed for each unit (EPA, Region 4, NC, GA, KY) to capture the strategies and issues that were unique for each. This adaptive coding process allowed for a blending of deductive categories from the conceptual framework with inductive categories that emerged from the data. Codes for each reform dimension were drawn from key topics in the “Dimensions of Environmental Governance Reform Framework” that was presented in Chapter 2 (Figure 2).

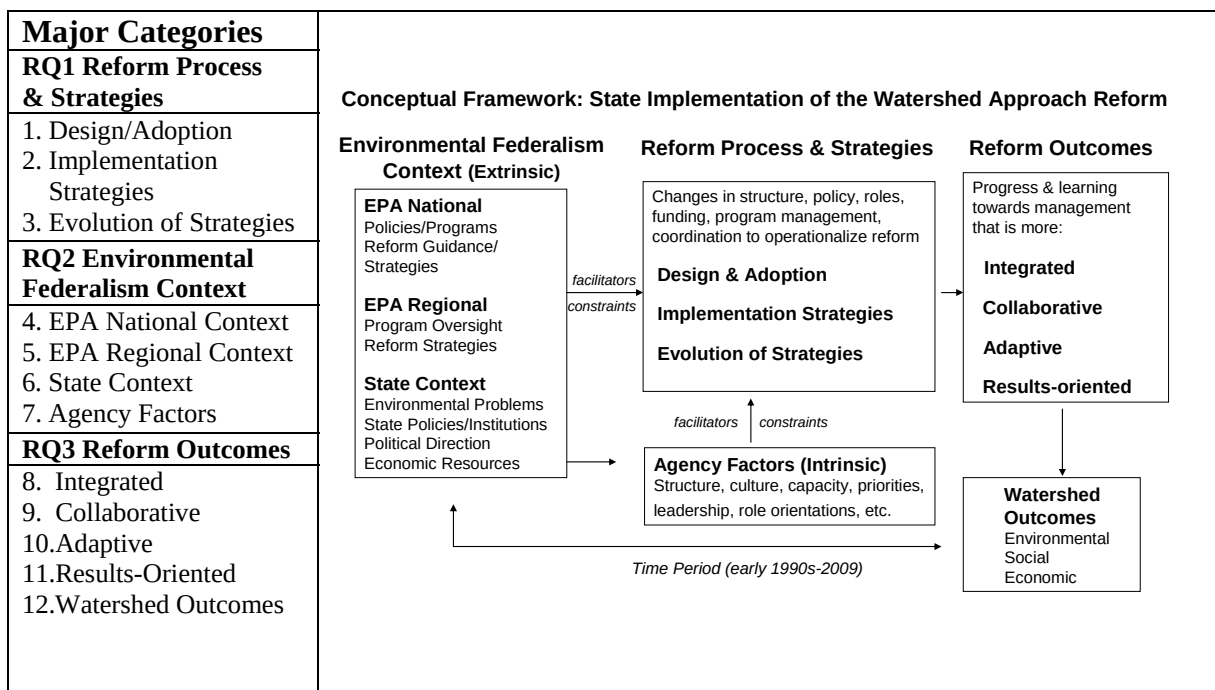


Figure 6. Major coding categories from conceptual framework.



The qualitative data analysis software QDA Miner, available through a University of Tennessee license agreement, was used as the case study database to store, organize, and code all interview transcripts, primary documents, and data summaries. The software allowed for all relevant pieces of text in interviews and documents to be highlighted by the researcher and assigned one or more conceptual categories and descriptive codes. Reports were generated from QDA Miner that displayed the coded data aggregated by major category (e.g. with all pieces of data from documents and interviews related to the design and adoption of the state's watershed approach compiled in one report). This facilitated writing each section of the case description with a clear view of all relevant data, so that factual details, illustrative quotes, and summarized data could be readily cited. The coded data reports also aided triangulation across data sources to analyze confirming and conflicting evidence, patterns and tensions in perspectives, and unanswered questions in the data (Yin, 2009).

In multiple case study analysis, a description, analysis and summary of findings is developed first for each case, which then provides the basis for the researcher's cross-case analysis and discussion (Stake, 2006). In this study, the use of a common case study protocol and coding scheme allowed for the state case studies to be presented in an analytically consistent manner, though the outline used to describe watershed approach strategies followed the variation observed in the states. The case study protocol includes a list of analytical questions that was used to assist in assessing outcomes in each reform dimension (Appendix D). In addition, the protocol includes a cross case analysis worksheet that was used to synthesize findings from the national and regional context and state case studies for the final chapter's integrated discussion of the research questions.

### **3.4 Study Limitations and Methods to Enhance the Quality of Findings**

All research methodologies have inherent strengths and limitations which make them more or less suited to particular research problems. As has been discussed, a multiple case study research design was selected for its unique ability to provide a holistic description and analysis of agency reform processes occurring over a number of

years in particular institutional contexts. One limitation of case study research is that it does not produce knowledge that is statistically generalizable to a larger population. Although case studies can be designed to test hypotheses and develop explanatory theories in certain settings (Yin, 2009), often they are utilized for their rich descriptive and exploratory value, as in this study. The descriptive, qualitative focus of many case studies, while viewed as a limitation by some, offers a strong empirical complement to quantitative methodologies, particularly in understanding complex, context-dependent, phenomena that are difficult to measure. Other critiques of case study as a method relate to limitations of the researcher, such as lack of rigorous, systematic procedures and the influence of researcher bias and subjectivities on the case findings. Steps taken to address these potential limitations are discussed in this section.

In addition to general limitations of case study research, there are several specific issues in the scope of this study that should be acknowledged. First, the study's exploratory approach cast a wide net conceptually and temporally, aiming for a holistic embrace of three states' reform processes spanning 15 years, as well as EPA's related reform processes at national and regional scales. This broad scope enabled important questions to be explored about reform efforts within a federalism context, while limiting the depth at which each concept of interest could be examined. Many topics were necessarily summarized rather than given in-depth treatment. Indeed, an entire dissertation could easily focus on just one of the state reform strategies covered, such as the role of Kentucky's basin coordinators or North Carolina's nutrient trading policies. Furthermore, covering a long period of time involved the challenge of limited access to key informant perspectives on reform adoption and early implementation, as well as potential errors in participants' recall of experiences. Fortunately, substantial document coverage in early years balanced the limited interview data available. Despite these trade-offs in breadth versus depth, the research scope enabled a useful holistic treatment of a relatively unstudied yet important reform context, exploring a wide range of issues that could be the topic of more focused, in-depth research in the future.

As is the case in most studies involving a lone dissertation researcher, time and resource constraints limited the number of participant perspectives that were incorporated into the study. In all, around 45 in person interviews were conducted, transcribed, and analyzed, with careful selection of participants who had the most experience and diverse perspectives regarding the reform topics of interest. However, the findings could certainly have been enriched by including additional agency participants, such as program or regional office staff with more peripheral roles in the watershed approach framework. It was the aim of this research to tell the reform implementation story from the perspective of the agency participants who grapple with how to improve management practices within institutional constraints. Learning about the agency's watershed approach from key external stakeholders, such as other agencies, nongovernmental organizations, or political leaders, would likely provide a different and valuable assessment of reform progress, but was beyond the scope of this study.

A related potential limitation of this study is that it relies heavily on the perspectives of agency protagonists whose portrayal of reform efforts may be biased towards magnifying positive elements and downplaying negative aspects of watershed approach reforms. This is a valid concern which readers should keep in mind while reading the portrayal. However, there is not really any other method to learn about agency's internal reform processes than to learn from managers and staff directly. I was pleased to find that many of the managers interviewed were very candid with sharing the challenges and limitations of some of the watershed approach strategies that have been pursued. Nonetheless, the picture that is represented should be recognized for what it is to a large degree: a story told through the eyes of agency managers that each had a different vantage point on particular watershed approach efforts and may apply varying levels of positive spin, either intentionally to present the best image or because that is simply how they see things, having been a passionate champion of specific initiatives. The story is also filtered, however, through the research lens I brought to the case. From a wide range

of information and stories that were shared, I pulled out the aspects which seemed most relevant to the reform issues of interest in this research.

In contrast to quantitative research methodologies, there are not universally accepted standards for measuring significance, validity, and reliability of findings in qualitative research. In case study methodology, and in qualitative research more generally, the researcher is the primary instrument for data analysis and interpretation, which brings potential strengths and weaknesses. As Bloomberg and Volpe (2008) note, “criteria for evaluating qualitative research differ from those used in quantitative research, in that the focus is on how well the researcher has provided evidence that her or his descriptions and analysis represent the reality of the situations and persons studied.” (p. 76-77). Qualitative researchers often use alternative criteria to address the *trustworthiness* of a study, such as *credibility*, *dependability*, and *transferability* which respectively parallel the quantitative criteria of *validity*, *reliability*, and *generalizability* (Guba & Lincoln, 1998).

Credibility reflects how accurately the researcher has represented the phenomenon of study and participant perspectives, while dependability refers to “whether one can track the processes and procedures used to collect and interpret the data” (Bloomberg & Volpe, 2008). In this research, several established procedures were used to enhance the credibility and dependability of findings:

- Triangulation of data across multiple document sources and interview perspectives was used during data collection analysis to corroborate factual information and to assess patterns and inconsistencies in perspectives (Stake, 1995; Yin, 2009).
- Member checking, or participant verification, was used to gather feedback and factual corrections from key informants regarding draft versions of the state case studies and the national and regional policy context chapter (Guba & Lincoln, 1998; Stake 1995)
- The case study protocol, coding and cross-case analysis procedures, and case study database in QDA Miner established a clear, transparent record of data collection and analysis procedures used in the study (Yin, 2009)

As has been noted, case study research is not aimed at or suitable for producing findings that are generalizable to larger populations. For this reason, some qualitative researchers use the criterion of *transferability* to address “how well the study has made it possible for the reader to decide whether similar processes will be at work in their own settings...by understanding in depth how they occur at the research site” (Bloomberg & Volpe, 2008). This is achieved through providing a thorough or “thick” description of the case and its context, as was endeavored in this research, so that readers can assess what findings might be applicable to their own setting. In addition, case studies, while not suited for statistical generalization, can produce rich knowledge about context-dependent processes that can be generalized to theory (Yin, 2009). The conceptual framework guiding data collection and analysis in this research facilitated the generation of findings relevant to environmental governance reform theory in a federalism context. Moreover, the intentional selection of multiple information-rich cases reflecting diverse reform contexts and strategies broadens the potential applicability of findings to other settings.

## **Chapter 4: National Policy Context**

The purpose of this chapter is to review elements of the national policy context at EPA that are relevant for understanding the state cases of watershed approach implementation in this study. The frame narrows in this review from the watershed approach as a comprehensive integration of water quality, quantity and other issues, as presented in the reform literature, to EPA's watershed approach which focuses on holistic strategies for water quality but not quantity. The first section provides an overview of key Clean Water Act programs and their evolution over time to illustrate the primary implementation responsibilities of state water quality agencies. The second section reviews EPA's watershed approach guidance and implementation strategies in three phases from 1991-2007. The third section provides a window into EPA Region 4's recent efforts to institutionalize the watershed approach through internal and external coordination mechanisms focused on achieving measurable water quality improvements in priority watersheds in the Southeast. Finally, the concluding section offers a brief summary of findings regarding reform outcomes that will be further discussed in the cross-case analysis in Chapter 6.

### **4.1 Programmatic Overview of Clean Water Act Implementation**

The Federal Pollution Control Act of 1972, commonly known as the Clean Water Act (CWA), laid the foundation for what is now a formidable policy structure governing water quality management in the United States. Prior to its passage, pollution control was predominantly a matter of state authority, with federal pollution laws quite limited in their scope. Environmental disasters in the late 1960s, such as the heavily polluted Cuyahoga River catching fire, stoked public demand for environmental policy action. Congressional leaders responded by consolidating strong regulatory powers at the federal level through sweeping legislation for water, air, and other issues. The Clean Water Act articulated an ambitious, holistic goal to "protect and restore the physical, chemical, and biological integrity of the nation's waters" and to make all waters fishable and

swimmable by 1983 (CWA Section 101). To pursue these aims, the CWA used two main policy strategies that reflected a compromise between national and state interests at the time: a federally prescribed permitting system of technology-based standards to reduce pollution discharges and a water quality standards approach managed at the state level (Houck, 1999). As is portrayed in this brief summary, CWA implementation has evolved considerably over the years, with each program having its own unique history and direction. Since state agencies have primary implementation responsibility in most cases, they too have grown, adapted, and structured themselves around the ever-evolving program requirements.

The driving focus of early CWA implementation was reducing obvious “end-of-pipe” pollution from human sewage and factories. The National Pollutant Discharge Elimination System (NPDES) program was intended to accomplish the Act’s ambitious goal to eliminate all pollution discharges by 1985 (CWA Section 402). It used a classic command-and-control strategy in which EPA prescribed technology-based standards for wastewater treatment with which industrial and municipal facilities were obligated to comply or face potentially stiff penalties. Under the NPDES program, all dischargers are required to obtain a permit from the state, or from EPA in the few states where authority is not delegated, that specifies the required pollution control mechanisms and effluent limits. Compliance is monitored and enforced primarily by states through regular monitoring and reporting requirements of permittees, though EPA has authority to take enforcement action where requested by states or where state action is deemed insufficient.

Along with this regulatory “stick” that compelled action, the CWA included a significant “carrot” of funding for municipalities and public utilities strapped with the costly new requirements. The Construction Grants program provided massive funding to build sewage treatment plants across the country. Since the CWA was passed over \$75 billion has been invested to provide the basic wastewater infrastructure we have in place today (EPA 2010c). In the late 1980s, when increased devolution of policy requirements

from federal to state and local levels was occurring, the Construction Grants program was phased out and a new a Clean Water State Revolving Fund loan program was created (CWA Section 601). This program, managed by state agencies, provides loans to local entities to construct or improve wastewater and stormwater infrastructure. States also manage a similar loan program to fund drinking water treatment infrastructure under the federal Safe Drinking Water Act.

The focus on building and regulating wastewater treatment facilities consumed the bulk of EPA and state water quality agencies' attention for the first two decades of CWA implementation. By the mid 1980s, pollution from these "point sources" – discrete, end-of-pipe discharges – had been dramatically reduced. Attention of policymakers and EPA shifted to the more complex and politically thorny problem of "nonpoint source" pollution arising from diffuse impacts across the landscape, such as agriculture, land development, and stormwater runoff from urban areas. The problem of nonpoint source pollution was recognized but excluded from direct regulation in the CWA, due to consistent political opposition from agricultural and other nonpoint source interests as well as significant feasibility issues involved in regulating such numerous, diffuse, and diverse pollutant sources. Amendments to the CWA in 1987 required EPA and states to manage a new non-regulatory program for nonpoint sources of pollution (CWA Section 319). The main impact of the program was to provide a new source of grant funding for landowners and organizations to implement voluntary "best management practices" towards reducing erosion, sedimentation, and the influx of fertilizers, pesticides, and animal waste into waterways.

Perhaps the most significant shift in nonpoint source pollution policy around this time was that EPA began regulating certain stormwater discharges as point sources of pollution under the NPDES program. In 1990, EPA promulgated Phase 1 stormwater regulations which gradually took effect and were implemented over the next decade. The regulations established permitting requirements for the largest municipal storm sewer systems, construction sites over 5 acres, and certain industrial, commercial, and



construction sites. Phase II stormwater regulations in 1999 expanded permitting requirements to a much larger class of smaller municipal storm sewer systems and construction sites greater than 1 acre. The NPDES stormwater program differs from its wastewater counterpart in that permitted entities select from a suite of best management practices rather than following a prescribed federal standard with monitored effluent limits. The regulations have dramatically increased the role and responsibilities of local governments in managing stormwater runoff.

The second major policy strategy written into the CWA was a state-managed water quality standards approach to maintain healthy conditions in surface waters, as contrasted with the technology-based, end-of-pipe standards discussed above. This approach was favored by many states at the time of the CWA's passage, because it theoretically allows for greater flexibility and discretion for state agencies to address problems in a manner appropriate to their state context (Houck, 1999). Under this portion of the CWA, states establish water quality standards which are in essence a set of numeric and narrative criteria a waterbody must meet in order to support its assigned "designated uses," such as public water supply, fish and aquatic life, recreational contact (CWA Section 303). State water quality standards must be aligned with federal minimum requirements set by EPA and are reviewed every three years by states and EPA to incorporate needed revisions. With standards in place, states are required to run a monitoring program that assesses how waters in the state measure up to the standards and report to EPA and the public on the status of water quality every 2 years (CWA Section 305(b)).

As part of this monitoring and assessment regime, states are required to identify waters that are "impaired," or not meeting standards for their designated uses, and issue a list of these waters for EPA and public review every two years (CWA Section 303(d)). For each waterbody listed as impaired for a particular pollutant (e.g. sediment), states are required to develop a "total maximum daily load" (TMDL) calculation of how much pollutant loading reduction is required from nearby point and/or nonpoint sources in

order for the waterbody to meet water quality standards for that pollutant. The point source pollutant reductions are supposed to be translated into new wasteload allocations in NPDES permits for those dischargers identified as contributing to the loading. Nonpoint source reductions, or “load allocations” are generally expressed in cumulative, general terms, not allocated to specific entities, and are meant to be addressed through voluntary federal grant programs and regulatory or voluntary mechanisms that exist at the state or local level.

The CWA’s Section 303(d) requirements for listing impaired waters and developing TMDLs were virtually ignored by states and EPA for two decades until the 1990s, when a wave of citizen lawsuits filed by environmental organizations compelled action (Houck, 1999). EPA and states were sued for failing to generate adequate impaired waters lists and/or neglecting to develop TMDLs for impaired waters. In many states, the lawsuits generated consent orders or decrees for states and EPA to generate TMDLs expeditiously on court ordered time schedules (EPA 2010d). Environmental groups were hopeful that TMDLs would finally provide a stronger regulatory tool to address cumulative watershed impacts, reduce nonpoint source pollution, and restore health to persistently degraded waters. However, the statute stops short of a required implementation strategy to achieve nonpoint source load reductions, so EPA’s mechanisms for addressing these pollutants remain voluntary. The court cases put EPA and many states into production mode, scrambling to develop the technical capacity to be able to produce TMDL documents on fast time tables and often with very limited available data (NRC, 2001). In 2000, EPA issued a new TMDL rule aiming to clarify and strengthen the program requirements, but the politically controversial rule was withdrawn in 2003, leaving the program to be managed under the earlier 1992 EPA guidance (Federal Register, 2003).

Returning to the big picture of CWA implementation by state agencies, Figure 7 shows the basic logic of how the core water quality programs are meant to work together to protect and restore water quality. As part of the programmatic funding they receive

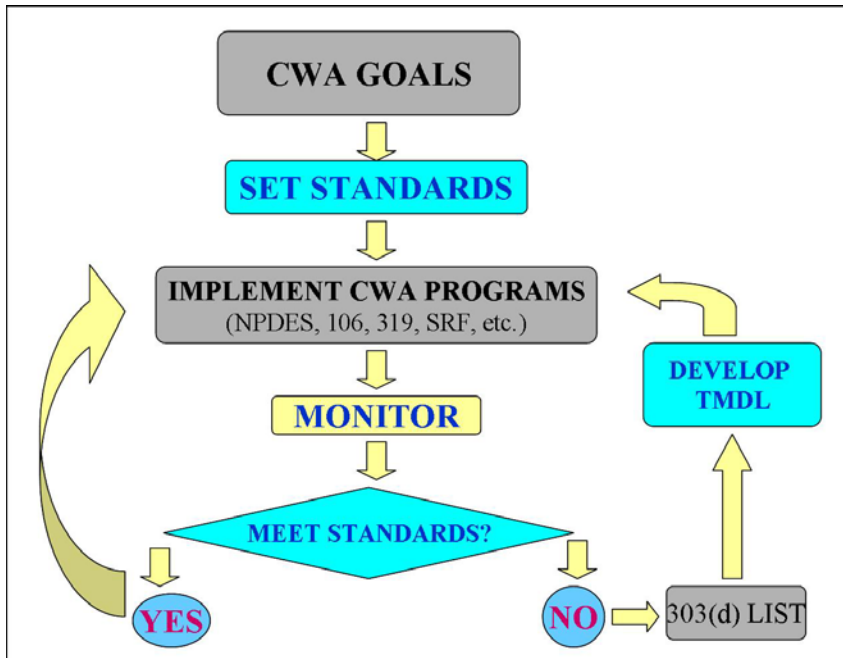


Figure 7. How the CWA programs are meant to function together  
(Source: EPA, internal document).

from EPA, state agencies are accountable for meeting and reporting on a litany of program activities and outputs each year, most of which are negotiated with EPA regional managers. A consequence of this accountability structure is that EPA and state programs have generally been managed independently in a “stovepiped” manner towards individual program outputs that are not well linked to water quality outcomes or a watershed scale. That is, in simplified terms, monitoring and assessment produce water quality and impaired waters reports for individual waterbodies every 2 years, NPDES permits are issued to individual facilities every 5 years, TMDLs are generated to address individual pollutants for individual waterbodies on court ordered or negotiated schedules, and nonpoint source grants and State Revolving Fund loans produce site specific projects based on who applies and the program selection criteria. As is discussed in Section 2 of this chapter, this fragmentation has been an ongoing problem that EPA and state watershed approach reforms have aimed to improve upon.

The programs summarized here reflect the core CWA responsibilities of states, but additional federal and state-specific policies and programs add to the complexity of state watershed management. The Safe Drinking Water Act of 1974 requires states to implement treatment regulations, compliance monitoring and enforcement, and source water protection activities to ensure that treated drinking water distributed by public utilities meets EPA public health standards. Many states also have programs to manage groundwater, wetlands and coastal areas though these programs may be housed in different state agencies than the water quality agency. The Clean Water Act's Section 404 permitting program that governs dredge and fill activities in wetlands and other waters is implemented by the U.S. Army Corps of Engineers in all but a few states, but state water quality agencies have responsibility for reviewing the water quality impacts of these permits (CWA Section 401). In short, as is shown in Chapter 5's case studies, the institutional structure for watershed management varies greatly from state to state and extends beyond the core Clean Water Act programs of focus in this policy context review.

A fundamental challenge facing states is the reality that while regulatory and programmatic responsibilities have grown increasingly complex and costly, federal funding has stayed constant or decreased. The Environmental Council of the States (2008) reported that from 2005-2008, state spending on the environment was expected to double while federal appropriations declined by around \$650 million. State and local governments have argued against the many unfunded federal mandates, such as NPDES stormwater program responsibilities which local communities have been scrambling to incorporate and financially support over the past decade. Across the country, aging wastewater and stormwater infrastructure that needs to be upgraded and new demands in developing areas will increasingly overwhelm the federal funding now available to support infrastructure. In 2002, EPA estimated that if infrastructure funding stays at present levels, the funding gap over the next 20 years could grow to \$122 billion and \$102 billion for clean water and drinking water capital costs, respectively (EPA, 2002b).

The next section highlights the rise of the watershed approach at EPA as a set of reform principles and strategies to more effectively address unsolved and emerging water quality problems.

## **4.2 EPA's Watershed Approach**

The notion of comprehensive watershed management was by no means initiated by EPA and had in fact been experimented with for decades, with limited effectiveness, in water supply management (Schlager & Blomquist, 2008; Feldman, 2007). The CWA also had provisions in Section 208 for multi-county water quality management planning, but the program was defunded in the early 1980s under the Reagan administration (Sirianni, 2006). EPA's first significant foray into integrated watershed management came in the early 1980s in the Chesapeake Bay, as an intergovernmental partnership was formed among EPA and the Bay's adjoining jurisdictions. The National Estuary Program, created by the 1987 CWA amendments and modeled after the Chesapeake Bay program, has been a prominent EPA laboratory for experimentation and innovation in collaborative watershed management (Imperial & Hennessey, 2000). With nonpoint source pollution as the leading unaddressed water quality problem on the policy agenda in the late 1980s, EPA sought to expand the techniques and lessons of these place-based programs to be applied more broadly at the federal, state and local level. This section offers a brief chronology of EPA's main strategies to operationalize the watershed approach, covering early implementation efforts (1991-1996), the Clean Water Action Plan of the Clinton administration (1997-2000), and subsequent evaluations and actions at EPA under the Bush administration (2001-2007).

### Early Watershed Approach Efforts (1991-1996)

In 1991, EPA released its first articulation of the "watershed protection approach," as an emerging framework for more integrated, comprehensive action to address problems at the watershed scale (EPA, 1991). The concise overview document introduced three main principles of this new approach which would remain a theme in guidance documents to come: 1) targeting watersheds based on greatest human health or

ecological risks, 2) involving all local stakeholders in analyzing problems and forging solutions, and 3) integrating the full range of programs, tools and organizations needed to address the problem. EPA provided brief descriptions and examples of putting the principles into practice through discrete, local *watershed protection projects* as well as emerging *watershed protection programs* of state agencies (North Carolina) and EPA regional offices (Region 4). The guidance was careful to note that the approach “is not a new centralized government program that competes with or replaces existing programs” but rather a “flexible framework for focusing and integrating current efforts and for exploring innovative methods to achieve maximum efficiency and effect” (EPA, 1991, p.3).

This blended goal of efficiency and effectiveness, also a consistent emphasis in later EPA guidance documents, is well expressed in EPA’s initial framing of the rationale for the watershed approach:

Many significant water quality challenges remain...including difficult and controversial problems, such as pollutant runoff into waterways or seepage into groundwaters from nonpoint sources and the destruction of wetlands and other vital habitats. Uniform Federal regulation of these problems would be vastly expensive, and would impinge on traditional State and local prerogatives, such as land use and economic development. Governments at all levels, therefore, are broadening their outlook on water quality protection, seeking nonconventional, cost-effective ways to address the remaining problems. Experience and common sense both point toward approaches that get "the biggest bang for the buck" (EPA, 1991 p.3)

The guidance concluded by outlining the EPA headquarters roles in advancing the watershed protection approach, which included providing technical tools and assistance, promoting information transfer among federal, state and local entities, and reorienting resources towards watershed protection projects as opportunities arose.

Around the time of this first guidance document, EPA initiated a number of organizational changes and initiatives aligned with the watershed approach. Earlier in 1991, EPA’s Office of Water created a new Office of Wetlands, Oceans and Watersheds which brought together programs for surface water quality monitoring, assessment, and

restoration (TMDLs), nonpoint source pollution, and wetlands, coastal and marine protection (EPA, 1992). EPA highlighted its own efforts to pursue watershed strategies in conjunction with partners in a 150-page *Watershed Protection Approach 1993-1994 Activity Report* (EPA, 1994a). The litany of initiatives in the report reflected EPA's "five-prong approach" to implement the watershed approach: *Try it* in specific watersheds; *Advertise it* through conferences, newsletters, and publications; *Integrate it* into programs; *Develop tools for it*; and *Measure it* to monitor success and adjust strategies as needed. A few most notable products of EPA's broad-based promotion efforts included the Watersheds '93 conference attended by over a thousand professionals, the Watershed Academy training program started in 1994, and a comprehensive 1995 guidance document on how to apply the watershed approach in specific local multi-stakeholder projects (EPA, 1994a; EPA, 1995a)

Cognizant of the critical role of states in implementing water quality and other programs, EPA focused much effort during this time period on persuading states to adopt a watershed approach framework for greater coordination of activities at a river basin or watershed scale. Recognizing that local watershed-based projects were not really a new phenomenon, EPA asserted:

...what is different is EPA's adoption of the watershed protection approach as an operational approach. The EPA Office of Water is encouraging water quality agencies to orient their programs towards watersheds as management units and to begin comprehensive control projects in targeted watersheds (EPA, 1995a, p.18)

EPA worked with consultants to develop a lengthy 300-page training manual and a guidance document for developing statewide watershed approach frameworks (EPA, 1994b; EPA, 1995b). In 1995, two-day Statewide Watershed Management Courses were held in five locations around the country for over 300 state agency participants (EPA, 1996). In addition, EPA contracted with consultants to offer preliminary scoping and more intensive facilitation services for states interested in reorienting their programs around a basin management model.

The statewide watershed framework presented in EPA trainings was modeled after North Carolina's recently adopted basin planning process, but was expanded somewhat for application to varied state contexts. Although EPA's guidance acknowledged that each state may address watershed management differently and avoided prescribing actions, the guidance did put forth common elements of a state framework as follows (EPA, 1995b). First, the state is divided into geographic management units (typically river basins) with a management schedule for cycling program activities through basins in an iterative process. Within each basin, a sequence of management activities is conducted to strategically monitor and assess conditions, set goals and priorities, develop basin plans, implement plans through permits, grants and other policy tools, and begin the next cycle of monitoring. The 5-year "rotating basin" cycle, as it came to be known, would ideally coordinate and streamline a number of water-related program functions, though decisions about who and what to integrate were left to state discretion. The framework emphasized the value of interagency coordination and public involvement in the basin planning and implementation process. In the guidance, the statewide watershed approach was envisioned as a comprehensive integration of concerns, including "needs to protect public health (including drinking water), critical habitats such as wetlands, biological integrity and surface and ground waters." (EPA, 1995b, p.4)

EPA's guidance and training documents were quite thorough in detailing the steps and considerations involved in designing each of these state framework elements, and also spoke directly to addressing the organizational changes and potential barriers involved in the transition process. Many of the states that adopted a watershed framework at this time did so with some level of coordination and "neutral facilitation" from the consultants contracted by EPA to provide these services. EPA's guidance portrayed a number of potential benefits of a statewide watershed approach which included: a focus on environmental results rather than just program outputs; better knowledge base for decisions and opportunities for data sharing; enhanced program efficiency; improved



coordination with EPA and other agencies; targeting of resources towards priority issues; and enhanced public involvement (EPA, 1995b)

Aligned with these efforts to promote the watershed approach at the state level, EPA issued a *NPDES Watershed Strategy* in 1994 (EPA, 1994c). The strategy emphasized the importance of integrating the NPDES permitting program into EPA's watershed approach and state basin planning frameworks. A dominant feature of the basin planning framework, adopted by a number of states and encouraged by the NPDES Watershed Strategy, was synchronizing the issuance of 5-year NPDES permits with the basin planning cycle. Thus, all the permits for a given basin would be reviewed and reissued at the same time, in accordance with the basin management plan developed from recent monitoring and assessment data for the basin. In theory, this approach encouraged the consideration of cumulative watershed impacts of permitted activities, rather than looking only at the impacts of a particular facility in the isolated, fragmented way that has been typical in the NPDES program. In order to advance the NPDES Watershed Strategy and statewide basin planning frameworks, EPA issued guidance instructing the regional offices to do assessments of their states' watershed protection efforts and to develop action plans to encourage state efforts (EPA, 1994d).

EPA's operational strategies to promote the watershed approach in the regions, states, and NPDES program were developed and supported by a National Watershed Management Policy Committee. The Committee was composed of upper level water program managers from EPA headquarters and regional offices and chaired by EPA's Assistant Administrator for Water at the time (EPA, 1994a). EPA's most energetic promotion and documentation of the watershed approach as a new organizational strategy occurred during this early time period, mostly directed at states. Following these early efforts, EPA's attention shifted to development and implementation of the Clinton administration's Clean Water Action Plan which was released in 1998.

### Clean Water Action Plan (1997-2000)

EPA's watershed approach was supported and no doubt influenced by the favorable orientation of the Clinton administration (1992-2000) and the looming Clean Water Act reauthorization process. Beyond the Office of Water, this was the reform era in which initiatives for reinventing environmental regulation, ecosystem management, and community-based environmental protection were prominent. In 1994, *President Clinton's Clean Water Initiative* laid out in 170 pages a proposed direction for the Clean Water Act reauthorization scheduled for that year that was clearly aligned with the watershed approach:

In sum, the Clinton Administration is asking Congress, in reauthorizing the CWA, to enter a new era in environmental protection. Instead of simply controlling the end of the discharge pipe, we propose to protect and conserve our water, aquatic habitats, and the living resources within, through an integrated, holistic approach, based on natural watersheds, and aimed at reducing pollutants from all sources that impair water quality (EPA 1994e, p.v-vi)

Although the reauthorization attempt was stymied due to political controversy and gridlock surrounding the Act, the Clinton administration moved ahead with trying to effect change within the domain of its executive powers.

In 1997, on the 25<sup>th</sup> anniversary of the CWA's passage, Vice President Gore directed EPA to work with other federal agencies to develop a Clean Water Action Plan to reach the yet unattained goal of "fishable and swimmable" waters for all Americans. The Action Plan, released in 1998, emphasized the watershed approach as "key to the future" and broadened its applicability beyond EPA to the larger family of federal agencies that play a role in natural resource stewardship (CWAP, 1998). In 1999, 12 regional federal interagency coordination teams were formed to pursue opportunities for collaboration on watershed restoration activities (CWAP, 2000). A first year progress report on the Action Plan touted that "an unprecedented commitment to cooperation has developed among federal agencies as they unite the missions of many departments and programs in the pursuit of clean water" (CWAP, 1999). As an outcome of these efforts, 8 federal agencies signed onto a *Unified Federal Approach to Federal Land and Resource*

*Management*, including the EPA, Tennessee Valley Authority, Army Corps of Engineers, and the Departments of Agriculture, Commerce, Energy, Interior, and Defense (Federal Register, 2000). The Action Plan set forth 111 “key actions”, tracked in annual progress reports in 1999 and 2000, which involved commitments to a wide range of water quality protection and restoration activities by EPA, USDA programs, and other agencies.

Related to these interagency collaboration efforts, the Action Plan also encouraged stakeholder involvement in watershed protection and restoration through several strategies. The interagency coordination teams organized at least one Regional Watershed Roundtable meeting in each area which brought together a diverse array of stakeholders such as civic organizations, businesses, agriculture interests, and government agencies at the local, state and federal level (CWAP, 2000). Delegates were selected from the regional roundtables to participate in a culminating National Watershed Forum in 2001, in which participants met in issue-based discussion groups and generated recommendations for national policy directions (Meridian Institute, 2001). The Action Plan also dedicated funding to build the capacity of local watershed organizations through a Watershed Assistant Grants program that was administered by the River Network, a national nonprofit organization. As of 2000, the program had distributed \$643,000 to 47 organizations to support the monitoring, education, outreach, and planning capabilities of local watershed partnerships (CWAP, 2000).

The Action Plan seized the opportunity to call on states to prioritize and target watersheds for collaborative restoration efforts, a concept that had been part of earlier articulations of the watershed approach but only as voluntary guidance. Under the Action Plan, states were to work with other agencies to develop Unified Watershed Assessments that would streamline and synthesize watershed assessment information from the disparate programs such as 305(b) and 303(d) reporting, nonpoint source, drinking water, coastal and wetlands. From these assessments, states were to prioritize watersheds for targeted restoration activities and develop Watershed Restoration Action Strategies to address these, building on TMDLs where available. A brief but important caveat was

inserted in these instructions: “Nothing in the current law requires a watershed approach to addressing water quality problems, but federal agencies want to offer incentives to develop Watershed Restoration Action Strategies” (CWAP, 1998, p. 78).

The incentive offered was \$100 million in new “incremental” nonpoint source program funding to be distributed among the states for the express purpose of developing and implementing Watershed Restoration Action Strategies. Although the 1987 CWA amendments specify that nonpoint source grants should be implemented on a watershed basis to the extent practicable, in many cases states lacked adequate funding and/or incentive to do so. The FY1999 guidance for use of the new incremental funding asserted:

Congress' decision to double the appropriations for the nonpoint source program reflects its recognition of the need to expedite our national efforts to control nonpoint source pollution and to focus our attention on sources of nonpoint pollution that contribute to impairment of waters (EPA, 1998)

The funding was only eligible, however, to states that had completed their Unified Watershed Assessments and identified priority “Category 1” watersheds for restoration actions by October 1998. Thus, there was an incredibly tight time frame for states to generate the assessments and priorities between when the guidance for the assessments was released in June 1998 and the deadline 4 months later. Nonetheless, all the states and Territories and more than 80 Tribes did end up completing assessments and collectively identifying 800 of the Nation’s 2149 watersheds (8-digit HUC scale) as priorities for restoration activities using the new incremental nonpoint source funds (CWAP, 2000).

The Action Plan’s strong emphasis on restoring water quality in the burgeoning list of impaired waters was no doubt tied to the high profile, controversial, and in-transition status of the TMDL program at this time. By the late 1990s, TMDL lawsuits were playing out in over 30 states with widely variable outcomes set by the courts for EPA and state implementation requirements. In 1998, EPA convened a FACA Committee of point and nonpoint source industries and environmental groups to develop a coherent, consistent, and ideally consensus-based direction for EPA’s TMDL program

in years to come (Houck, 1999). Before the Clinton administration wrapped up, EPA issued a TMDL Rule that specified a number of measures to strengthen the program including a new requirement that TMDLs include implementation plans for achieving point and nonpoint source load reductions. The rule drew much controversy for a number of reasons beyond the scope of this review and was ultimately withdrawn in 2003. The emphasis on making progress in restoring impaired waters through watershed approach strategies continued at EPA under the Bush administration, but not with the elevated attention and momentum it had under the Clean Water Action Plan.

#### Evaluation and “Recommitment” (2001-2007)

In 2002, a memo was released from the new Office of Water Assistant Administrator which indicated the need for a renewed commitment to the watershed approach at EPA:

Although a decade of effort has resulted in general awareness of the watershed approach within the Agency, recent evaluations show substantial gaps in actual implementation. The watershed approach should not be seen as merely a special initiative, targeted at just a selected set of places or involving a relatively small group of EPA or state staff. Rather, it should be the fulcrum of our restoration and protection efforts, and those of our many stakeholders, private and public (EPA, 2002c).

The memo underscored the central role of the watershed approach in making progress on persistent water quality challenges and the need for additional organizational changes at EPA:

Failure to fully incorporate the watershed approach into program implementation will result in failure to achieve our environmental objectives in many of our nation's waters... The watershed approach is essential to address our most pressing water issues, and now is the right time to focus and re-invigorate our efforts to more fully institutionalize the approach - both on the ground and as a cornerstone of our core water programs. (EPA, 2002c)

The implementation gaps referred to in the memo were demonstrated, in part, in an evaluation report EPA released in 2002 that assessed statewide watershed management approaches. The evaluation reported that over 20 states had adopted a

statewide watershed management framework, many of which had obtained training and facilitation support from EPA's contractor services (EPA, 2002a). Although many states had made significant investments to reorient programs around a basin planning framework and were generally positive about the benefits of doing so, a number of challenges to internal program integration and interagency coordination were raised. State managers called attention to barriers related to the stovepiped nature of Clean Water Act programs, each driven towards independent schedules and output measures, and EPA's role in reinforcing this fragmentation by rigidly focusing on short term program outputs (bean counting) rather than long term environmental outcomes. The evaluators concluded with a number of recommendations for EPA, as well as states, to address limitations and barriers.

To respond to these issues, the 2002 memo called for the creation of a Watershed Management Council composed of a senior level manager from each major office within the Office of Water and each regional water division. The Council was charged with a number of tasks, such as recommending actions to strengthen program integration particularly between CWA and Safe Drinking Water Act programs, expanding capacity building services for local stakeholder efforts, issuing guidance for watershed-based permitting and other watershed-related program innovations, and addressing barriers related to program accountability systems. With regards to working with states, the memo seemed to back off a bit from EPA's earlier stance of promoting a basin planning framework for state watershed management:

As you know, there can be many variations in the specific approaches states use to implement programs on a watershed basis. It is not my intention that EPA impose or specify a particular watershed management model. Rather, we should support states in implementing the approaches they find work best for them. I want to expand our efforts to help states that are seeking assistance in adopting a statewide watershed approach; and I want to assist those states that have already begun to implement watershed management for certain elements of their programs to broaden their application where practicable. I would also like to have EPA's Statewide Watershed Approach Framework document updated to better reflect this philosophy. (EPA 2002c)

Since 2002, EPA's coordination mechanisms to promote watershed approach strategies across EPA programs and regions have evolved over time. The Watershed Management Council was active until 2005 when the Assistant Administrator who had championed the 2002 watershed approach revival retired and the Council was dissolved. In its place, a National Watershed Managers Forum was chartered in 2005, consisting of mid-level managers from each of the regions and water programs at headquarters who met in a bi-monthly call to discuss various watershed-related initiatives. At headquarters, a "Linkage Group" was also meeting periodically during these years to foster better internal communication and coordination among key water programs such as water quality standards, monitoring, NPDES permitting, nonpoint source, TMDL, and source water protection. Two main thrusts of these coordination efforts have been developing and refining Strategic Plan performance measures and creating a capacity building strategy for local watershed organizations.

Under the Bush administration, which continued to stress performance accountability, EPA's Office of Water grappled with how to incorporate strategic water quality outcome measures into an agency that has long been structured around individual statutory program outputs (EPA, 2005). The primary way that the watershed approach has been incorporated into the Strategic Plan is through Subobjective 2.2.1 "to improve water quality on a watershed basis" (EPA, 2003a). In the 2003-2008 Strategic Plan, EPA experimented with two new water quality outcome measure targets for 2008:

- In 600 of the Nation's watersheds, water quality standards are met in at least 80 percent of the assessed water segments (2002 Baseline: 453 watersheds of total 2,262 watersheds nationally)
- In 200 watersheds, all assessed water segments maintain their quality and at least 20 percent of assessed water segments show improvement above conditions as of 2002. (2002 Baseline: 0 watersheds) (EPA 2003a, p. 41)

Based on critical feedback from a 2005 Office of Management and Budget "PART" performance review and an EPA Inspector General evaluation, regional and headquarters managers in the Watershed Managers Forum worked together to hash out

new strategic outcome and program activity measures for the 2006-2011 Strategic Plan (EPA, 2005). The three new strategic outcome targets for 2012 under the “improve water quality on a watershed basis” goal are: (referred to in shorthand as measures SP-10, 11 and 12)

- SP-10 - Attain water quality standards for all pollutants and impairments in more than 2,250 of the 39,798 water bodies identified by states as impaired in 2002
- SP-11 - Remove at least 5,600 of the estimated 69,677 specific causes of water body impairment identified by states in 2002
- SP-12 - Improve water quality conditions in 250 impaired watersheds nationwide, of the 4,800 impaired “watersheds of focus” (priority watersheds) identified by EPA and states, using the watershed approach. “Improved” means 1 or more of the impairment causes identified in 2002 are removed for at least 40 percent of the impaired water bodies or impaired miles/acres, or there is significant watershed-wide improvement, as demonstrated by valid scientific information, in 1 or more water quality parameters associated with the impairments (EPA, 2006).

One important change made in the measures between the two Strategic Plans was the shift from a larger 8-digit HUC watershed scale to a smaller 12-digit HUC watershed scale, which states and Regions felt was more feasible for demonstrating measurable improvement.

Three main implementation strategies were outlined for achieving the strategic outcome targets in recent Strategic Plans (EPA, 2005). First, EPA would continue to implement core clean water programs (standards, monitoring, NPDES, TMDL, nonpoint source, clean water state revolving fund), taking steps to strengthen programs and encourage their implementation on a watershed basis. Second, EPA would accelerate local watershed protection efforts by providing tools and technical assistance for watershed planning; collaborating with federal agencies, states, local governments and environmental organizations; and funding watershed projects through the Targeted Watersheds Grants program. Third, EPA would apply adaptive management to continuously improve performance, which included “setting challenging but realistic goals, improving assessment and monitoring, and identifying barriers to implementation”



(EPA, 2005, p. 3). The remainder of this section summarizes the key steps EPA has taken to encourage implementation of core clean water programs on a watershed basis and its capacity building strategies to accelerate local watershed protection.

Following its programmatic advances under the Clean Water Action Plan, the nonpoint source program continued to receive the additional \$100 million in incremental funding for restoration activities in impaired waters. However, in the 2001-2003 time period, the direction on how the incremental funds could be used changed each year, based on iterative rounds of feedback from states and stakeholders (EPA, 2002d). First, the targeting of incremental funds was shifted from the priority watersheds identified in the Unified Watershed Assessments to the development and implementation of nonpoint source TMDLs in impaired waters. Then for FY2003, the guidance backed off from the required TMDL focus and instead targeted the incremental funds to the development and implementation of watershed-based plans to address impaired waters. The watershed-based plan had to address nine elements, summarized here in simple terms, and be approved by the state before funding for nonpoint source implementation activities could be granted:

1. Identify causes & sources of pollution to be addressed by management measures
2. Estimate load reductions expected from management measures
3. Describe management measures & targeted critical areas
4. Estimate technical and financial assistance needed
5. Develop public education component to encourage implementation.
6. Develop schedule for implementation that is “reasonably expeditious”
7. Describe interim, measurable milestones for implementation
8. Identify indicators to measure progress and to determine if plan revision is needed
9. Develop a monitoring component to track indicators and evaluate effectiveness over time (EPA, 2002d)

This change to the program has probably been the strongest incentive created by EPA to propel restoration activities at the watershed scale. It dramatically raised the bar in terms of the technical requirements for local entities seeking to implement on-the-ground nonpoint source pollution reduction practices. There have been some challenges in the transition years since the new planning requirements, in terms of the inadequate

quality of many of the plans submitted and approved by states and the related needs of local stakeholders for assistance in these technical elements (interview). In response to these needs, the nonpoint source program released a comprehensive 400-page *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* in draft form in 2006 (EPA, 2008a). The handbook, though arguably overwhelming for users in length and scope, reflects EPA's most in-depth guidance to date on applying a watershed approach at the local level.

During this time period, EPA also released updated guidance documents for implementing NPDES permits at the watershed scale (EPA, 2003b, EPA, 2007a). While the earlier NPDES watershed strategy (EPA, 1994b) had focused on synchronizing the issuance of traditional 5-year NPDES permits for facilities with the basin planning schedule, the new strategy also encouraged issuing watershed scale permits to cover multiple point source facilities. For example, a permit would be issued that was intended to meet overall load allocation targets for the watershed, such as those based on a TMDL, and then there would be flexibility for the individual facilities to internally negotiate and coordinate their discharges to meet that limit. Such a strategy, while not the only watershed permitting model presented in the guidance, helps set the stage for water quality pollutant trading. While watershed-based NPDES strategies have now been encouraged in guidance for over a decade, the use of watershed-scale permits in states has been quite limited. A number of states adopted permit synchronization as part of a basin planning framework, but most states have not yet been willing to embrace the uncertain outcomes and perceived added cost and complexity of changing to watershed-scale permits (interview).

Aligned with the watershed permitting guidance and the Bush administration's enthusiasm for market-based strategies, EPA continued to promote water quality trading through guidance, tools, and funding of pilot projects. Building on water quality trading guidance and pilot projects during the prior administration, EPA issued a new Water Quality Trading Policy in 2003 and provided \$800,000 in funding for 11 new pilot

projects around the country (EPA 2003c). The concise 11-page policy encouraged voluntary watershed-based trading based on the efficiency argument that it:

...allows one source to meet its regulatory obligations by using pollutant reductions created by another source that has lower pollution control costs. Trading capitalizes on economies of scale and the control cost differentials among and between sources.

The 2003 policy endorsed trading in suitable contexts for sediment and nutrients only, stating that other pollutants might be approved on a case by case basis after greater scrutiny regarding possible health and toxic accumulation concerns. Since then, EPA has published additional guidance documents that aid in assessing whether and what type of trading might be appropriate in a given watershed context and provide a “how-to” manual on trading for permit writers (EPA 2004, EPA 2007b)

Guidance for applying a watershed approach to the TMDL program was slower in coming. Although the TMDL program in theory should be useful in addressing cumulative watershed impacts, the CWA defines a TMDL as a pollutant-waterbody combination. Thus, many states have created separate TMDLs for individual pollutants on individual stream segments, thus undermining the program’s potential to forge holistic strategies to address multiple pollutants at the watershed scale. EPA guidance documents have for years suggested the potential gains in efficiency and effectiveness of using a watershed approach in the TMDL program but comprehensive guidance on watershed-based TMDLs did not emerge until the end of 2008 (EPA 2008b). Perhaps the timing was appropriate, in that many states are just starting to complete court-ordered TMDL schedules and may be more willing to experiment with watershed-based strategies. The 2008 guidance covers many technical and program design considerations concerning watershed-based TMDLs and includes 8 case studies from around the country.

In addition to these program-specific applications, EPA’s second main strategy for achieving the Strategic Plan’s water quality improvement goals extends beyond implementation of core programs to accelerate local watershed restoration efforts through providing tools, trainings and capacity building assistance. EPA has continued its focus

on general training through the Watershed Academy’s free webcast seminars on a variety of watershed management topics. When the Clean Water Action Plan’s Watershed Assistant Grants ended, a new Targeted Watershed Grants program was launched which competitively distributed \$50 million to 61 watershed organizations from 2003-2006 and also provided some funding to national and regional watershed capacity building organizations (EPA, 2010e). EPA’s Watershed Managers Forum developed a *Capacity Building Strategy for Local Watershed Organizations* which was sent to the Regions in 2007 (EPA 2007c). The strategy asked Regions to identify a “matrix” of current and future capacity building activities, such as targeting EPA training and technical assistance to state priority watersheds and enhancing partnerships with federal agencies, universities, professional associations and other “third party providers” of local capacity building services.

In 2007, EPA released an updated definition of the watershed approach on its website, the main components of which were incorporated into the new Strategic Plan measure SP-12 focused on improving water quality using the watershed approach. Stakeholders had expressed lack of clarity about the watershed approach, due to the variation in EPA guidance at different points in time and from different program areas (EPA, 2005). In particular, some stakeholders felt the portrayal of state watershed approaches in EPA’s 2002 evaluation was too limited to the “rotating basin” model of synchronizing NPDES permits and should be broadened to focus more on local stakeholder efforts (interview). The Watershed Managers Forum and Linkage Group worked to hash out a definition that the different programs could agree to, which resulted in the following:

A Watershed Approach:

- Is hydrologically defined
  - geographically focused
  - includes all stressors (air and water)
- Involves all stakeholders
  - includes public (federal, state, local) and private sector
  - is community based

- o includes a coordinating framework
- Strategically addresses priority water resource goals (e.g. water quality, habitat)
  - o integrates multiple programs (regulatory and voluntary)
  - o based on sound science
  - o aided by strategic watershed plans
  - o uses adaptive management (EPA, 2010b)

In 2005, at a point when some of these strategies had been initiated and others were still to come, the EPA Office of Inspector General published an evaluation report entitled *Sustained Commitment Needed to Further Advance the Watershed Approach* (EPA, 2005). The report examined EPA's watershed approach efforts and gathered feedback from states and stakeholder groups, concluding:

If EPA is committed to the watershed approach, it needs to make improvement in four key elements:

1. Integrating watershed activities into its core water programs
2. Addressing stakeholder concerns to increase their participation
3. Refining and improving key aspects of its strategic planning process
4. Improving the watershed performance measurement system (EPA 2005, p.1)

Some of the report's recommendations have been addressed to an extent through EPA's guidance documents discussed above for implementing nonpoint source, NPDES, and TMDL programs at the watershed scale and the new Strategic Plan measures created. However, as will be discussed further in Chapter 6, there has been little evidence of progress at EPA headquarters in substantively addressing EPA-related barriers to state watershed approach implementation that were identified by states in the 2002 and 2005 evaluations.

Some EPA headquarters managers, when interviewed about state watershed approach efforts, were quick to acknowledge their "35,000 foot" perspectives managing national programs in Washington DC and their limited direct knowledge of how state watershed management frameworks operate. The 10 EPA regional offices are the ones who interface directly with state programs, playing a bridging and balancing role between EPA headquarters policies and state agency priorities and constraints. In interviews at EPA headquarters and with the River Network and the Association of State and Interstate

Water Pollution Control Administrators, Region 4 was recognized as a leader in trying to institutionalize the watershed approach principles in its work with states and local watershed initiatives in the southeast region. The next section provides an overview of Region 4's evolving watershed approach efforts, illustrating some of the important discretionary opportunities and constraints that exist at the regional level in the federalist framework.

### **4.3 EPA Region 4's Watershed Approach**

This section examines the recent efforts of EPA Region 4 to prioritize and operationalize the watershed approach under the leadership of the regional Water Protection Division Director who came on board in 2002. The Region 4 office in Atlanta oversees the implementation of Clean Water Act and Safe Drinking Water Act programs in the eight southeastern states of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee. Since 2002, the Division has undergone two reorganizations to support new operational strategies that enhance internal program coordination and external collaboration in priority watersheds to achieve measurable restoration outcomes. Drawing from key informant interviews and available internal documents, this section summarizes Region 4's watershed approach reform process and strategies, covering key challenges and lessons learned from implementation thus far. To protect confidentiality of the small number of key informants, the findings are presented without individual interview citations. Additional analysis and discussion of the Region 4 findings, with respect to the study's research questions, is provided in Chapter 6.

It is important to note that the reform efforts described here were preceded by various prior strategies at Region 4 to incorporate and encourage the watershed approach principles. As early as 1991, Region 4's Savannah River Watershed Protection Project was highlighted by EPA as a model for regional leadership in the watershed approach (EPA, 1991). In 1994-95, when EPA headquarters and regional managers were defining organizational strategies to promote the watershed approach internally and among states, Region 4 created the Geographic Planning and Technical Support Branch and supported

state basin planning frameworks. Under the interagency collaboration directives of the Clean Water Action Plan (1998-2000), Region 4 co-chaired with the Tennessee Valley Authority a Watershed Committee under the umbrella of the Southeast Natural Resource Leadership Group. This organization is comprised of the heads of eleven federal entities in the southeast with natural resource responsibilities. The Committee fostered annual regional stakeholder roundtables through a new Southeast Watershed Forum nonprofit organization. In 2001, with only one staff member dedicated to promoting watershed strategies throughout the region, the Division Director at the time created a Watersheds and Nonpoint Source Section adding six new staff for more hands-on watershed work. However, the agency's watershed approach efforts during these years were significantly constrained by the resource-consuming workload of meeting EPA and states' court-ordered TMDL schedules in the region.

#### Reorganizing for the Watershed Approach

The new Division Director who arrived at Region 4 in 2003 felt that additional organizational changes were needed to advance watershed approach strategies in order to achieve greater environmental results in the region. This orientation was rooted in the Director's prior decade of experience managing EPA's watershed-based programs in the Great Lakes and Gulf of Mexico. After six months in the position, the Director initiated reform dialogue by giving presentations to managers and staff about the need for greater internal and external integration to strategically pursue water quality improvements. The dialogue culminated in a reorganization at the end of 2004 which created a new high-level Watershed Management Office that reported directly to the Director's office. Senior program staff members were selected to fill new roles created in the office: eight state watershed coordinators, two specialists in assessment methodologies for measuring results, and five staff dedicated to regional watershed capacity building initiatives. The office was directed by the former Watersheds and Nonpoint Source section chief, with leadership also provided by the regional watershed coordinator who had facilitated earlier Clean Water Action Plan collaboration in the region.

The new structure and roles created by the Watershed Management Office facilitated several core changes to management processes focused on achieving strategic outcomes in priority watersheds in the region. First, a 4-phase watershed restoration process was established for working with state and local stakeholders in priority watersheds and tracking results. Second, cross-division workgroups were assigned to each state to enhance internal integration among water programs in support of the priority watershed initiatives. Third, the new state watershed coordinator role provided the critical lynchpin, holding together these strands of internal and external collaboration to advance the priority watershed initiatives. The EPA Strategic Plan Subobjective 2.2.1 (to improve water quality on a watershed basis) and the associated water quality improvement measures (SP-10, 11, 12) provided the driving goals and measurable end targets of these Region 4 strategies.

The state watershed coordinators were given primary responsibility for shepherding a watershed restoration process which consisted of four phases: *Explore, Build and Prepare, Implement, and Transition to Maintenance*. The process was modeled after the watershed approach framework instituted by the Tennessee Valley Authority in the late 1990s, but adapted somewhat to fit EPA's context. Region 4 developed a process tracking tool, the "restoration pipeline", which charts progress of over 100 priority watershed projects in the region through the four phases. In addition, a *Watershed Criteria Checklist* was developed that gives coordinators a menu of steps that the watershed needs to go through and gives them a predictable mechanism to track why things may not be moving forward. Another purpose of the checklist is to provide documentation of the watershed work going on in case of turnover in the state coordinator position. As one manager noted regarding some of the agency's watershed efforts prior to forming the Watershed Management Office:

One of the criticisms we get as an agency when we play on the ground is that we don't stick around long enough to finish the job. That's because in the past if the EPA person changes positions, there isn't another person who will get assigned to that – there's no backfill because this isn't a CWA program, not something that



we're on the hook for. So, we were dropping the ball with the stakeholders on the ground when staff transitioned out of a project.

The preliminary *Explore* phase involves selecting priority watersheds based on several criteria related to achieving measurable water quality improvements. State watershed coordinators initially worked with counterparts at the state level to identify watersheds with a combination of: 1) clusters of water quality impairments (303(d) listed streams), 2) stakeholders with interest and capacity to lead restoration efforts, and 3) prior investments by EPA or other agency programs to improve water quality, such as nonpoint source grants. Using these basic criteria, the coordinator worked with state agency managers to define a portfolio of priority watersheds where EPA could add value to existing efforts and where EPA and state partners would work together to achieve and measure strategic water quality targets (SP-10,11,12). To some degree, priority watersheds were also selected to reflect a diversity of water quality issues, so that any successful strategies that were developed could be transferred to similar problems in other watersheds around the state. Some Region 4 managers conceptualized the different types of watershed capacity building support as “retail”, working with local stakeholders on direct projects on the ground, versus “wholesale”, working with state entities to strengthen programs and transfer effective watershed approach strategies statewide.

Building on a preliminary assessment of priority watersheds conducted in the *Explore* phase, the *Build and Prepare* phase consists of all the technical and collaborative steps needed to generate a plan for watershed restoration actions. Additional data gathering, field monitoring, and analysis may be conducted to identify specific pollutant sources and design targeted restoration strategies. A collaborative process among relevant agencies and watershed stakeholders is used to generate a watershed plan. Often, the plan is developed to meet the EPA nonpoint source program’s nine required elements, but in cases where this particular funding is not sought, a simpler, targeted plan may suffice. During this phase of the restoration pipeline, a plan for ongoing communication and

development of funding strategies is developed to serve the watershed stakeholder group as it moves from planning to implementation and self-sufficiency.

The last two phases of the process, *Implementation* and *Transition to Maintenance*, involve implementing the strategies outlined in the watershed plan, monitoring and tracking results, and adjusting strategies as needed. Once a strategic water quality target is attained, ideally an SP-12 watershed improvement, then EPA focuses on *Transition to Maintenance*. This phase recognizes that watershed initiatives must be self-sufficient over the long-term, which is one of the greatest challenges of local watershed projects that rely on volunteer effort and project-based grant funding. Therefore, the fourth phase focuses on solidifying the capacity of the watershed stakeholder group to continue watershed protection, restoration and monitoring efforts in the future, as EPA shifts its targeted support to other priority watersheds.

The restoration pipeline and tracking elements serve as internal management tools for Region 4 and are not necessarily shared or emphasized with local stakeholders. In practice, the process of working with stakeholders on watershed initiatives—most of which were already underway in some form when EPA joined in—is more fluid, context-specific, and not necessarily linear as the pipeline suggests. As one coordinator shared of a particular initiative:

So here in one watershed, we've got part of the watershed in Phase 2, part in Phase 3 and part in Phase 4, but I think that is the reality of jumping in with a process and trying to make it fit. When I'm on the circuit talking with people...I often don't talk about the four phases because it's more of an internal process.

Region 4 leaders recognized that it often takes a number of years to move through the steps of planning, implementation, and monitoring before any measurable water quality improvement may be captured. Because EPA Regions were being held accountable for reporting annual progress in these measures, Region 4 worked with states to select some priority watersheds where restoration efforts had already been implemented and focused on trying to capture where water quality improvements had occurred as a result of agencies and/or stakeholders using a watershed approach. Thus, in

some cases the “portfolio” was designed, as in financial investment terms, to yield some short-term successes (accounting for past accomplishments) and some longer-term successes (accounting for new accomplishments from the restoration pipeline process). Identifying the short-term successes was in many ways an exercise in detective work and connecting the dots: where did the state monitoring data show water quality improvements and where could these be linked to watershed protection or restoration activities of agencies and stakeholders. In general, state and EPA reporting systems were not set up to track these connections, so state watershed coordinators were working with EPA and state program managers and databases to reconstruct what had happened, as well as doing additional post-implementation monitoring of restoration efforts.

In order to empower these priority initiatives in states, the state watershed coordinators were given a second significant task of facilitating internal water program integration through cross-division state workgroups. State workgroups had existed previously in Region 4 to promote communication across programs, but this strategy extended that to mobilize and focus program tools to achieve results in specific watersheds. The state watershed coordinators led workgroup meetings with around 8-12 program staff members from diverse programs such as TMDL, Nonpoint Source, NPDES permitting, and others. The workgroups were intended to get the program tools working together on the assessment, planning, and implementation steps needed to support stakeholder efforts in the priority watersheds, including providing technical assistance (e.g. reviewing a monitoring or watershed-based plan) or addressing barriers related to EPA programs.

#### Implementation Outcomes and New Strategies

The main measure of success for Region 4’s efforts has been the strategic plan target SP-12, which tracks the number of “watersheds of focus” identified by EPA and states that have achieved a certain extent of measured water quality improvements *using the watershed approach*. The measure targets watersheds at the 12-digit HUC scale and defines the watershed approach as using stakeholder involvement, an integrated set of

tools and programs, and an iterative planning process (adaptive management) to address priority water resource goals (EPA 2008b). The Watershed Management Office was accountable for achieving one watershed improvement per state per year for five years, totaling 40 watersheds. In actuality, the office was able to report 10 watershed improvements each in 2007 and 2008, which represented a third of the total SP-12's reported by the 10 EPA Regions during this initial time period during which the measure has been used. As one manager noted:

The only reason that happened is because we dedicated people – these watershed coordinators – to finding out what links needed to happen to effect change. It's like having a local watershed coordinator...if you don't have someone whose job it is to make connections, they don't happen spontaneously. People default to their stovepipe because that's what they've known for 30 years of agency work. We all know the watershed approach works by applying the different tools collectively to specific problems to get specific results.

Along with these accomplishments, there were a number of challenges associated with implementing the new approach, particularly with regards to the state workgroup process. A year after the reorganization, a series of listening sessions was conducted to capture feedback from staff and supervisors to improve the state workgroup process (internal report, 2006). One theme from the feedback was that program staff lacked clarity regarding what they were specifically supposed to contribute to the priority watershed initiatives and how to juggle their full plate of program responsibilities with the extra work and sometimes conflicting priorities of the state workgroup process. On the whole, the staff perceived a lack of commitment and direction from upper level program managers for the priority watershed focus, and some questioned the buy in of state managers as well. Because many staff members at EPA are very technically orientated, some expressed frustration at the lack of good data available on the priority watersheds and the ambiguity of the process. An overarching theme from the feedback was the need for better communication with staff throughout the Division about the activities of the Watershed Management Office, which operated outside of the program structure of the organization.

The outcomes of the state workgroup process varied to some degree based on the individual approach of the state watershed coordinators:

There are eight watershed coordinators and they do the job in eight different ways. I don't think any one of them does the job remotely consistent with what the others are doing. That's a function of several things: one, they bring different expertise to the table, we all come at things from our toolbox. Second, our states are that different, the needs and politics of how to play on the ground in a state are very different. The stakeholder base in each state is very different – some stakeholder groups are very strong and independent, others need more hand-holding.

We've got the eight coordinators and each of them works very differently. Some are very inclusive in terms of trying to bring more people in, but sometimes it's hard for some of them to think broadly enough in terms of the benefits of all the programs. It's very easy to implement your own ideas and activities and not have to reach out to someone else to coordinate that. It's also very easy for the watershed coordinators to focus on what they know, the programs they have experience with...it's hard to break that particular tendency.

The state watershed coordinators had a challenging role in juggling the varied internal and external dynamics of their task. One manager described the mentality of program staff in some of the workgroups as “why are you making me do extra work – not why are you making me do *different* work – when you're not even my boss.” In addition, some states were more interested than others in rallying around Region 4's new priority watershed restoration agenda, for varying reasons. For example, some states have been more reticent to identify and concentrate resources on “priority watersheds” due to political pressures to direct attention in other issues or spread the wealth around the state rather evenly. In addition to the internal and external tensions of aligning priorities, the watershed coordinators were in a steep learning curve on several dimensions – learning how to work with unfamiliar programs and facilitate teams, learning how to support local stakeholder efforts from the Atlanta office with minimal travel funds, learning what it takes to achieve measurable results in particular local watershed contexts. As one leader reflected:

We put too much on the watershed coordinators, expecting them to be both internal team leaders and external place rangers. They were trying to do too many things and they weren't necessarily equipped to do either one. There is no training program for that role, so we still need to work on that.

In 2007, the Director sent a memo to all managers and staff expressing that although some progress had been made, the watershed approach needed to be more fully institutionalized and embraced throughout the Division. Since the former reorganization had been relatively top-down and encountered resistance from some program managers and staff, this time a bottom-up process was utilized to directly engage a broader group in the change effort. This was in part prompted by a phenomenon observed by several managers in the first reorganization:

It's like any kind of organizational change. You've got your early adopters, the 20% that intuitively go out there and say I get this, I know what you want, I know how to get there. I can pick out that 20% by hand. You've got 20% that aren't going to go there, for a variety of reasons. But you've got 60% in the middle that say, if I can be convinced that this is a good investment then I would come along. Those are the ones we we're after...and that's going to take a little time.

A Managing for Environmental Results workgroup was created, which consisted of around 25-30 staff and mid-level managers selected from a pool of volunteers to reflect diverse program areas. The workgroup generated a list of 200 recommended changes. As one manager reflected, "It's funny, nobody wants to change but when you sit them down in a room and say what do you think needs to be changed, then suddenly everything needed to change." The senior managers held an offsite retreat to review the workgroup's recommendations and used a group selection process to cluster priority recommendations into five categories: 1) Roles, Responsibilities and Reorganization, 2) Integrated Workplan, 3) Measures, 4) Training and Staff Development, and 5) State Evaluation. A "Theme Team" of 7-10 managers and staff from different programs was assigned to each of these categories to develop and report on a cohesive strategy to the senior management team. These strategies were in the process of being implemented through a second reorganization in late 2008 when research interviews were conducted.

While it is beyond the scope of this review to substantively cover all of the management process adjustments that were developed, a few critical changes in strategy based on lessons learned from the first reorganization should be mentioned. First, one of the main obstacles to state workgroup effectiveness was that some staff members faced conflicting priorities between the program output expectations of their supervisors (section chiefs) and the watershed outcome pursuits of the state watershed coordinators. The second reorganization aimed to better engage these program supervisors in the watershed restoration process through a new “core state workgroup” consisting of a management advisor (branch chief or deputy administrator), two program section chiefs, and the state watershed coordinator. This extends the accountability for cross-program integration beyond the lone state watershed coordinator, because each section and branch chief is assigned to a core workgroup that is accountable for achieving water quality outcome targets:

The main difference now is that it's the responsibility of the whole management team to make sure that people don't become insular in their boxes and understand the relationship between all the boxes. We want to create the sense that we're a Division, not just a conglomeration of individual programs doing their own thing. We have a collective responsibility for making sure the boxes are working together to get the environmental results. Section chiefs are now on the hook and will now have to struggle with the tension of how to manage staff towards both program outputs and watershed outcomes.

A closely linked strategy that one of the Theme Teams worked on involves the development of an annual Integrated Workplan for the Division. The Division had become increasingly “bean-driven” by program commitments without having a unified workplan. The Integrated Workplan is intended to be a strategic tool prompting program managers to “struggle with what the priorities will be given the resource limitations [and] do a more conscious balancing act to define what the focus will be.” The Integrated Workplan for the Division is to be forged by the management team in a 2-3 day annual planning retreat. The focus of the core state workgroups will be implementing the Integrated Workplan for each state, which provides a roadmap of the steps needed to

achieve water quality restoration outcomes in priority watersheds through working with internal programs, states, and stakeholder groups. The core workgroup will coordinate with program staff in the larger state workgroup and also pull in other staff expertise as needed for particular issues.

The Theme Teams that focused on Measures and the State Evaluation process grappled with how to better manage tensions and create stronger linkages between program output requirements and strategic outcome measures. The Measures team worked with staff in different program areas to develop new cross-program measures that clarify and reinforce how programs such as TMDL and NPDES need to work together, such as what information each needs to provide to the other. The State Evaluation team developed a new two tiered structure for evaluating state programs that consisted of an annual review of program integrity measures, as is typical, and a new set of program effectiveness measures to be assessed with states every five years. In 2008, the Director submitted a white paper to EPA headquarters requesting to conduct an integrated measures pilot to test the two tiered set of program integrity and effectiveness measures with willing states.

At the time of the interviews with Region 4 at the end of 2008, there was definitely a feeling of upheaval in the air with many staff moving offices and positions in conjunction with the reorganization. One leader indicated that he was repeatedly trying to convince people that “there’s a method to the madness.” It is easy to imagine that staff members who are not central to the watershed-focused mission might be wary or frustrated with the constant change process and two reorganizations in four years. Those possible staff perspectives were not captured in the research interviews, which focused on managers who were immersed in championing the watershed cause. It will be another wave of experimentation, challenge, and learning, to be sure, and no doubt changes in strategy have already occurred as implementation played out in the midst of a new presidential administration. One manager summed up the outlook at the time:

The jury is completely out on this latest step we've taken and we're not going to know for a couple years. It took four years to get this far...until we have a full set



of first line supervisors thinking that they've got to manage for results, it's not going to happen. That will be the big change – making people accountable; it will go as far as our ability to get people focused because that's the key.

## **4.4 Reform Outcomes**

This section briefly summarizes the key operational strategies that have been pursued by EPA and Region 4 as they relate to the four reform dimensions. Additional discussion of the EPA policy context in relation to the state cases and the reform literature is provided in Chapter 6.

### **Integrated Management**

EPA's watershed approach guidance over the years has stressed the need for a comprehensive integration of issues, programs and policy tools to address water quality goals at the watershed scale. The key operational strategies EPA has used to promote this integration are:

*State Basin Planning:* Early EPA watershed approach guidance focused on integrated management by states at a basin (large watershed) scale, linking monitoring and assessment activities with NPDES permitting in a 5 year cycle. The guidance left it to states to decide which internal programs (e.g. nonpoint source, TMDL) and interagency activities would be tied into the cycle.

*Targeting Watershed Restoration:* With the Clean Water Action Plan and the years that followed, EPA shifted emphasis from large-scale comprehensive basin planning to using the watershed approach for making progress in the burgeoning national 303(d) list of impaired waters. Thus, the scope of watershed problem solving narrowed to restoration actions in listed impaired waters, and the scale narrowed to target smaller sub-watersheds where measurable water quality improvements might be achieved in shorter time periods. To empower this focus, the Clean Water Action Plan doubled the funding of the nonpoint source program for restoration activities and required states to quickly put together Unified Watershed Assessments and Watershed Restoration Action Strategies for priority watersheds in order to be eligible for the new pot of funding. After this short-lived

initiative at the close of the Clinton administration, EPA continued the enhanced funding for restoration activities and tied the funds to new requirements for watershed-based plans that meet nine minimum elements.

*Watershed-based Program Guidance:* The core Clean Water Act programs have generally not been designed or implemented with a watershed perspective - permits focus on individual facilities, TMDLs address individual pollutants and stream segments, nonpoint source grants target individual project sites. In addition to the nonpoint source program changes discussed, EPA has produced voluntary guidance for watershed-based NPDES permitting since 1994 and more recently (2007) published guidance for implementing TMDL program requirements at a watershed scale. Interviews with EPA managers suggested that implementing watershed-based NPDES permits and TMDLs has been limited to a small number of innovations and pilots around the country, due in part to the added cost, complexity, and/or uncertainty of changing from the traditional program orientation.

*EPA Coordination Mechanisms:* Mechanisms at EPA headquarters over the years such as the Watershed Management Council, the Watershed Managers Forum, and the informal “Linkage Group” have engaged a limited number of program and regional leaders in cross-program communication and coordination. However, EPA’s management of individual programs in a fragmented “stovepiped” fashion has been reported by states as an ongoing barrier to integrated management.

*Region 4 Efforts:* EPA Region 4’s reorganization in 2004-2005 created eight state watershed coordinator positions with the role of facilitating internal program integration through cross-division state workgroups focused on pursuing measurable water quality improvements in priority watersheds. The state watershed coordinators also played a role in facilitating coordination among multiple agencies and local stakeholders in the priority watershed initiatives.

### Collaborative Management

Stakeholder involvement in watershed problem-solving has also been a key tenet of the watershed approach over the years at EPA, if for no other reason than the reality that EPA and most states lack regulatory authority over the nonpoint source pollution sources of leading concern.

*Place Based Programs:* EPA plays a direct role in collaborative watershed management in its ecosystem-scale “great waters” programs (Chesapeake Bay, Great Lakes, etc.) as well as the collaborative watershed governance structures supported in 28 estuaries by EPA’s National Estuary Program. These programs were not covered in this review because they apply to only certain places, and not the general policy structure for water quality management in all the states. Beyond these place-based programs, EPA’s focus is on managing the Clean Water Act and Safe Drinking Water Act programs which are built with traditional public participation requirements but no further collaborative mechanisms.

*Clean Water Action Plan:* The need for interagency collaboration, particularly among federal natural resource agencies, was elevated through the Clean Water Action Plan’s formation of regional interagency teams and the Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management. These coordination efforts supported two years of regional roundtable dialogues and a national watershed forum among a diverse array of stakeholder groups. It is not clear how well these interagency efforts have been sustained, if at all, in subsequent years without the driving focus of this executive initiative.

*Training, Tools and Capacity Building:* Much of EPA’s role in promoting collaborative watershed management has been through guidance, web-based trainings and tools, and relatively small but highly demanded grant programs (Sirianni, 2006). EPA’s Watershed Academy provides free online training modules and webinars on a wide range of watershed management topics. Starting with the Clean Water Action Plan, EPA has provided modest financial support to capacity building organizations and collaborative

watershed initiatives, first through Watershed Assistance Grants and later through Targeted Watershed Grants.

*Region 4 Efforts:* Region 4's state watershed coordinators interface directly with local stakeholders and to some extent facilitate local collaborative watershed initiatives, as much as can be done from the Atlanta office with very limited travel funds. Although Region 4 has been supporting watershed collaboration in limited ways since the early 1990s, the recent organizational changes have brought more focus and investment of staff time in local collaborative efforts in priority watersheds.

#### Adaptive Management

The term "adaptive management" did not really enter into EPA watershed-related guidance documents until after 2000, and its interpretation varies somewhat on the context in which it is presented. As was discussed in Section 2 of this chapter, adaptive management was included in the most recent watershed approach definition that appeared on the EPA website in 2007.

*State Basin & Watershed Planning:* Although EPA guidance in the 1990s did not use the specific term, the state watershed approach framework emphasized a 5-year basin management cycle that on paper looks very similar to the adaptive management process: monitoring and assessment followed by planning and implementation, with each cycle informed by the latest monitoring data. This generic model watershed management as an iterative cycle has been consistent also in EPA guidance for watershed-scale planning and projects.

*Strategic Planning:* Beginning with the 2003-2008 Strategic Plan, adaptive management is incorporated as one of three strategies for achieving the "improve water quality on a watershed basis" objectives. In annual program guidance documents related to the strategic plan, EPA refers to their process of tracking performance targets and adjusting strategies as "adaptive management," so their use of the term is not limited to the watershed context.

### Results-Oriented Management

Since the early guidance documents, the watershed approach has been promoted as a means for greater efficiency and effectiveness in program management and innovative strategies for getting the “biggest bang for the buck.” The emphasis on achieving measurable water quality results has steadily increased in the years following the Clean Water Action Plan.

*Priority Watersheds:* Early watershed approach guidance recommended targeting watersheds with highest human health or ecological risk for focused multi-stakeholder problem-solving. The Clean Water Action Plan required states to assess and prioritize watersheds for Watershed Restoration Action Plans in order to receive new incremental nonpoint source restoration funding.

*Strategic Planning:* Since the 2003-2008 Strategic Plan, the Watershed Managers Forum at EPA has worked to develop and refine strategic outcome measures connected to water quality improvements (SP-10, SP-11, SP-12), as well as program activity measures. The Strategic Plan measure SP-12 aims to track progress in achieving watershed improvements through using the watershed approach. EPA Regional Offices make commitments and report on these measures in mid-year and annual performance reports.

*Market-Based Strategies:* EPA released policy guidance in 1996 and 2003 to promote watershed-based pollutant trading and has funded a number of pilots around the country. Since 2003, EPA has released additional guidance and a how-to manual for permit writers.

*Region 4 Efforts:* Managing for environmental results has been the driving thrust of Region 4’s watershed approach strategies since 2003. State watershed coordinators at Region 4 work with their state agency and local stakeholder groups to meet the strategic plan targets in priority watersheds, currently one 12-digit HUC watershed improvement per state per year. Key criteria used to select priority watersheds with states include clusters of impaired streams, interest and capacity of stakeholders to work on restoration, and areas of previous EPA investment where measurable water quality improvements

may be demonstrated more quickly. Region 4 has developed a number of other strategies in its most recent reorganization to get managers throughout the Division managing towards water quality outcomes in addition to program outputs.

## **Chapter 5: State Case Studies**

### **5.1 Introduction to Cases**

The case studies in this chapter chart the evolution of watershed approach strategies in North Carolina, Georgia, and Kentucky. This evolution took several years, received guidance from EPA, but also responded to environmental, political, and economic conditions unique to each state. Hence, there has been a co-evolution of strategies to some degree between EPA and the states. In North Carolina, the agency adopted a basinwide planning framework in 1991 that organized program management at the river basin scale. This was at the same time that EPA was beginning to articulate the watershed approach principles. EPA promoted North Carolina's basin planning model in the years that followed, providing guidance, trainings, and grants for consultant facilitation services for states to develop similar watershed management frameworks. In 1992, Georgia's state legislature mandated river basin planning and the agency used EPA funding for facilitation services to develop its basin planning process. Kentucky also took advantage of the EPA-funded facilitation services to develop its watershed framework in 1996-97. As is demonstrated in the cases, the frameworks that were adopted in the three states shared some common elements, as influenced by North Carolina's model and EPA's guidance, but they also had unique strategies and implementation stories.

It is important to clarify that states have not used the term "reform," or even necessarily "watershed approach," to describe the changes they have made in the direction of watershed management. They did not take a set of EPA principles and practices and try to apply them to their operations. Rather, they started with basin planning as a new way of coordinating program activities with a watershed focus. Over time, the states' watershed management approaches evolved: some strategies were continued, others were dropped, and others were added. Thus, trying to draw boundaries around a state's watershed approach is a subjective and not clear cut exercise. In a sense,

all of the agency's program functions are a part of watershed management. In defining the scope of each case, I focused on the management strategies that attempted to address problems at the watershed scale and reflected to some degree a movement towards more integrated, collaborative, adaptive, and/or results-oriented management. It is also important to note that the strategies reviewed for these agencies are not the only watershed approach efforts in the state – many other organizations contribute to watershed governance at different scales, but were beyond the scope of these cases.



## **Case Study A: North Carolina's Watershed Approach Reforms**

### **5A.1 Introduction & Context**

This case study focuses on the watershed approach strategies that have been implemented by North Carolina's Division of Water Quality. The case begins with the agency's adoption of basinwide planning in 1991, which later served as a model for EPA's guidance and trainings in the 1990s on statewide frameworks for implementing the watershed approach. North Carolina has taken innovative steps to address nutrient pollution in several river basins and watersheds, experimenting with watershed permitting and trading for point sources and regulatory strategies for nonpoint sources. In recent years, the Division has worked with EPA Region 4 on a Use Restoration Waters program to support local stakeholder-based restoration efforts in priority watersheds. This introductory section provides a brief review of some key environmental and institutional factors that provide context for the watershed approach strategies covered in the case study.

North Carolina's watersheds cover a geographic range from the Appalachian mountains in the west, to the rolling hills of the central "Piedmont" region, to the eastern coastal plains and estuaries on the Atlantic coast. The Albemarle-Pamlico Sounds, which sit between the state's coastline and string of barrier islands, constitute the second largest estuary system in the country, after the Chesapeake Bay. The estuary region is fed by five major river basins which originate in middle North Carolina and southern Virginia. Two of these, the Neuse and Tar-Pamlico Rivers, flow entirely within the state and have been the focus of significant state policies to reduce excess nutrient pollution which causes algal blooms, periodic fish kills, and other ecological and economic losses in the estuaries. The upper portions of these two river basins, as well as the Cape Fear basin to the south, lie in the densely populated and rapidly urbanizing area surrounding Raleigh-Durham. The region's high rate of growth and development generates increasing point and nonpoint source pollution impacts on the river systems and the coastal areas downstream.

In North Carolina, the Division of Water Quality (DWQ) within the Department of Environment and Natural Resources implements Clean Water Act requirements and other state water quality programs. The central DWQ office in Raleigh houses water quality programs for monitoring, NPDES and wetlands permitting, nonpoint source, TMDL, basinwide planning, aquifer protection, and state revolving fund loans. The seven regional offices around the state perform a number of functions related to monitoring, permitting, compliance inspections, and enforcement. Since the early 1990s when the case begins, the agency has grown in complexity and size from a smaller Water Quality Section in the Division of Environmental Management to become a Division itself, increasing in staff from around 200 to around 450 personnel in 2009.

There are a number of water-related programs in North Carolina that are outside the scope of DWQ, housed in other divisions and programs within the Department of Environment and Natural Resources. The Division of Water Resources implements state requirements for water supply planning at the local, basin, and state level, but these planning efforts are independent of DWQ. The Division of Environmental Health implements the federal Safe Drinking Water Act requirements and runs programs for public water supply, source water protection, onsite wastewater systems, shellfish sanitation and recreational water quality. The divisions of Soil and Water Conservation, Forest Resources and Land Resources (state sediment and erosion control permitting) play important roles in managing nonpoint source pollution. The Soil and Water Conservation Division is particularly important in working with county district offices and the federal Natural Resource Conservation Service to administer a number of federal and state agricultural cost share programs. Finally, North Carolina has separate agencies to manage coastal resources, including the Albemarle-Pamlico National Estuary Program which was one of the first established in EPA's national program.

In North Carolina, state policymakers have played a proactive role in passing watershed-based policies that go beyond CWA requirements, in particular for reducing the input of nutrients such as nitrogen and phosphorus into estuaries and reservoirs. In

1979, the Environmental Management Commission (EMC), the state's environmental rulemaking body, created a special use classification to designate "nutrient sensitive waters" wherein comprehensive nutrient management strategies would be required. The impact of this policy started expanding in the late 1980s when the entire Tar-Pamlico and Neuse River basins were designated nutrient sensitive waters and the agency started putting stricter limits on NPDES wastewater dischargers. In 1995, as record rainfalls overwhelmed the Neuse estuary with nutrient runoff, there were severe algal blooms, fish kills, and an outbreak of the toxic dinoflagellate *Pfiesteria piscicida* which provoked high media attention and public concern. The state legislature responded by mandating a 30% reduction of nitrogen loading to the Neuse estuary within 5 years, based on recommendations from a committee of scientific experts. The policy called on the EMC to adopt a comprehensive set of rules to achieve the reductions from point *and nonpoint sources*, a significant step since EPA and most states do not regulate nonpoint source pollution.

In addition to these nutrient policies, North Carolina has established significant funding mechanisms for watershed protection and restoration activities, which sit external to DWQ. The Clean Water Management Trust Fund, established by the state legislature in 1996, receives an annual state appropriation of up to \$100 million which funds projects to "(1) enhance or restore degraded waters, (2) protect unpolluted waters, and/or (3) contribute toward a network of riparian buffers and greenways for environmental, educational, and recreational benefits" (CWMTF, 2010). The program has thus far competitively funded 1,380 grants, totaling more than \$946 million, to local governments, state agencies and conservation non-profits. In 2003, a new Ecosystem Enhancement Program was created through a Memorandum of Agreement between the NC Department of Environment and Natural Resources, NC Department of Transportation, and the U.S. Army Corps of Engineers. Incorporating the Wetlands Restoration Program that was established by the state legislature in 1997, the program serves as a streamlined mechanism for mitigating unavoidable environmental impacts

from transportation-infrastructure and other development projects by channeling mitigation funds into targeted “high quality, cost-effective watershed improvement and protection” projects (NCEEP, 2010). These two programs are beyond the scope of this case study but have dramatically expanded the resource base for watershed protection and restoration activities in the state.

The case study that follows tracks the adoption and evolution of three key watershed approach strategies that have been implemented by North Carolina’s DWQ. It should be noted that the agency’s watershed innovations have generally preceded EPA’s embrace of them, and that the “watershed approach” is not necessarily a term the agency readily applies to its efforts. Nonetheless, the strategies portrayed here illustrate a watershed approach in action, though each with a unique scope and orientation. Section 2 describes the basinwide planning framework adopted by DWQ in 1991. Section 3 reviews the agency’s role in implementing innovative nutrient management strategies for point and nonpoint sources in several of the state’s watersheds. Section 4 summarizes the emergence of the Use Restoration Waters program, a coordinated effort of DWQ and EPA Region 4 to support local restoration efforts in priority watersheds. Finally, the concluding section summarizes some of the case findings regarding the four reform dimensions of focus in this research, which will be further discussed in the cross-case analysis in Chapter 6.

## **5A.2 Basinwide Planning**

### Design & Adoption

The initiative to develop a new process for managing programs at the river basin scale arose in the late 1980s from within the agency. At the time, the Water Quality Section had around 200 employees and encompassed the four main functions of monitoring, planning, modeling, and permitting. The Section Chief and modeling program manager had a vision for making the programs work more efficiently and effectively together by organizing them around a basin management cycle. In those days, keeping up with the several thousand NPDES wastewater permits scattered across the

state on different time schedules was a significant management challenge. In addition, new policy strategies for addressing nutrient problems at a basin scale through more stringent permit limits and other measures were just beginning to take shape. The agency hired a consulting firm to facilitate a series of meetings from 1987-89 to engage program staff and managers in development of a basinwide management framework. The new framework was presented in public meetings, approved by EPA and the state, and set forth in a 64-page program description in 1991 (Creager & Baker, 1991).

The new framework set up an iterative 5 year basin management cycle to coordinate program activities for the state's 17 river basins. The schedule was designed so that 3-4 basins would move through each stage of the cycle at the same time. The 5-year cycle started in year 1 with water quality monitoring in the basin and culminated in year 5 with a basinwide plan and the issuance of NPDES permits. Along the way, monitoring data were assessed to evaluate whether or not individual waterbodies were meeting water quality standards. This water quality assessment provided the core content of the basinwide plans, although the plans also synthesized other information about issues, trends, and programs related to water management in the basin. To serve as a comprehensive basis for permitting decisions, the basinwide plans were to be completed, released for public comment, and approved by the EMC prior to issuing NPDES permits for the basin (Creager & Baker, 1991).

The design of the basinwide framework was largely driven by the intention to make NPDES permitting, the agency's core regulatory responsibility, more efficient and effective. Under the CWA, individual NPDES permits, which establish discharge limits for point source facilities, must be reviewed and reissued every 5 years. The permit requirements may change when reissued based on new information from water quality monitoring and modeling. The models used for permitting at that time focused on oxygen-demanding wastes and the assimilative capacity of receiving streams, in contrast to nutrient modeling which the agency started using in the 1990s (see Section 2). One problem the agency had encountered was that they would do the monitoring and

modeling for one permit in a basin, then the next year repeat the process for another nearby facility, and so on for other facilities in subsequent years. The new basinwide approach synchronized the permits so that the monitoring and modeling for all permits in a basin would be done during the same period. This saved travel time and allowed for a more comprehensive permitting strategy based on a basinwide perspective of water quality conditions and assimilative capacity. Another challenge facing the NPDES program was that the permit workload had been very erratic – 1000 permits one year, 300 the next – based on the random schedule at which permits were originally issued. The new basin schedule was carefully structured with some heavy and some light basins each year, in terms of number of NPDES permits, to create a relatively even workload of permits from year to year.

Although addressing point sources through NPDES permitting by basin was a major initial focus, the framework document articulated a broader range of objectives and longer-term goals (Creager & Baker, 1991). Basinwide planning was promoted as an integrated vehicle for meeting many of the planning and reporting requirements scattered throughout the CWA statute (e.g. sections 201 (c), 208, 303(d), 303(e), and 319). It was proposed that in subsequent cycles of basin planning, the plans would expand to encompass more comprehensive modeling and policy strategies to address the combined impacts of point and nonpoint source pollution, including development of TMDLs. Providing consistency and equitability for regulated entities in the design of pollution control strategies was another stated goal:

Consistency, together with greater attention to long-range planning, in turn, will promote a more equitable distribution of assimilative capacity, explicitly addressing potential trade-offs among pollutant sources (point and nonpoint) and allowances for future growth.(Creager & Baker, 1991, p.ii)

In practice, this goal only materialized in the basins with nutrient management strategies which are developed through separate rulemaking processes and tracked in basinwide plans (see Section 3).

Finally, a key purpose of the basinwide plans was to make the agency's wealth of water quality data accessible to the public, policy makers, and the regulated community "in a manner and level of detail that is easily understood and appreciated by both technical and nontechnical audiences" (Creager & Baker, 1991, p.14). As one agency leader noted:

We didn't have any mechanism at the time to involve the public, so there was a shift to non-regulatory summation of information. It allowed us to point out the problems in all these watersheds. It gave us a platform to put the information out and get the attention of environmental groups, legislators, concerned citizens, local governments, etc. Before that all we had was the reports for EPA; nobody read them. It simplified the egghead speech.

Apart from the major undertaking of restructuring the permit schedule, the new basin management framework did not involve much reorganization of roles and responsibilities in the agency, nor did it demand a significant influx of new resources. The main organizational change would be to increase the coordination and information exchange among programs. This was achieved by hiring a new basin planner, whose role was to coordinate among the monitoring, modeling, and permitting staff to accomplish the steps of the basin planning process. The basin planner also synthesized whatever information was available from other agencies about the basin and water quality related programs. The original basin planner wrote the first six basinwide plans independently. Over time, as leaders in the state saw the value of these innovative efforts, the agency was able to secure additional staff positions to support basin planning and management efforts. Around 1994-95, two more basin planners were hired and the team later expanded to 4 basin planners, a technical support person, and a manager for the unit.

#### Implementation & Evolution

The basinwide framework document addressed public participation only by committing to one or more public meetings on each draft plan before it went to the EMC for approval (Creager & Baker, 1991). However, after the first basinwide plan for the Neuse River basin was released in 1993, North Carolina State University's Cooperative

Extension Service stepped forward to facilitate public workshops in the basin to get input as each basinwide plan was being developed. In the workshops, the basin planner would present and answer questions regarding the water quality assessment information for the basin, and then participants would break into small group discussions facilitated by the extension agents. The feedback on priority issues and strategies was documented and used as a reference in drafting the plan sections on current and future water quality initiatives in the basin. When the second basin planning cycle began in the late 1990s, Cooperative Extension discontinued that role, but the agency's basin planning team assumed responsibility for facilitating the public workshops on the basin assessments and public meetings for input on draft plans. Around 2007, after a particularly hostile public meeting wherein a busload of constituents who were angry about proposed buffer rules derailed the basin planning agenda, the agency discontinued holding public workshops on the basinwide plans. Instead, the program has solicited input by email and held meetings with interested stakeholders upon request.

The format of the basinwide plans has changed over the years, though the basic components of providing an overview of the basin, presenting water quality assessments, and summarizing various agency programs and local initiatives in the basin has stayed consistent. Based on public feedback from the first round of plans, much of the general, non-basin specific information on water quality problems, best management practices, and agency programs was pulled out into a support document *A Citizen's Guide to Water Quality Management in North Carolina*, which was later updated and renamed in 2007 (NCDWQ, 2000, 2007). The second and third cycle plans contained more in-depth assessments of water quality conditions at the sub-basin scale, based on public requests for more detailed information to aid local watershed protection and restoration efforts. These changes in the late 1990s coincided with the heightened national interest in focusing on impaired waters, TMDLs, and restoration activities spurred by TMDL lawsuits in many states and the federal Clean Water Action Plan. The basin planners began communicating more with the agency's regional offices, county soil and water



conservation districts, and other organizations to try to incorporate more local information into the plans on what was being done, if anything, to address the issues and recommendations from prior basinwide plans.

In 1998, the state legislature passed the Clean Water Responsibility Act which contained a number of water quality policy measures, including a section that made DWQ's basinwide planning mandatory (NC SL 1997-458 [HB 515]). The policy recognized the value of the basinwide planning approach by turning the 5-year schedule that the agency had already developed and implemented on its own initiative into an ongoing requirement in the future. It did not, however, direct any additional resources to the agency for the task. At the time, the basinwide planning provisions of the law did not have much of an effect on what the agency was doing. However, the policy contained some additional requirements for basinwide plans covering nutrient sensitive waters. Specifically, it stipulated that basinwide plans for nutrient sensitive waters include a nutrient reduction goal, a 5-year plan for achieving the goal, and a mechanism for tracking incremental progress each year. This new requirement did not really come into focus in practice until the Neuse basinwide plan was being updated in 2007-08, as is discussed in Section 3. Since then, the basin planning team has been exploring how to make basinwide plans more of a true coordinated plan of action for the agency to address specific problems, rather than just summarizing different agency programs, local initiatives, and general recommendations.

These initial steps towards incorporating action plan elements have been part of a larger process of evaluation and transition in the basin planning program over the last few years. Around 2007, as the third cycle of basinwide plans was wrapping up, the basinwide planning program went through a turnover in staff and leadership. At the same time, the team has been getting input from other programs on ways to improve the effectiveness of the plans and planning process going forward. This has been fueled by a major strategic planning effort initiated by DWQ's Director in 2008-09. Through the strategic planning process, the agency and its programs are defining clear goals and

operational tactics, as well as mechanisms for measuring progress through program output and outcome measures. The basinwide plans hold potential to serve as a more strategic tool for coordinating and tracking progress across agency programs, but this will require programs to be much more engaged with the basin planning function than is currently practiced. As the agency's internal draft guidance for basin planning notes:

Moving forward with the Basinwide program requires integration of these goals and tactics into all of the Division's program areas and, in turn, into the Basinwide Water Quality Management Plans. Basinwide plans provide a vehicle for planning, tracking and documenting progress at accomplishing our mission across the state. However, integration of the Strategic Plan into Basinwide plans requires increased collaboration across all program areas within the Division.

...The Division has to find ways to work closely in the planning efforts to not only support development of Basinwide plans but to support initiatives and programs throughout DWQ. Basin plans done in a vacuum do not support DWQ's mission nor do they truly forward achieving our core goals and operational tactics. (NCDWQ internal document)

The basin planning team, with input from other program staff, has also been working on developing a more efficient plan format for the fourth planning cycle. Basinwide plans have always required a monumental synthesis of information which one planner likened to doing a dissertation. Much of the information has been copied and pasted from other internal and external agency reports. Some staff have pointed out that the plans are too long and overwhelming for practical use in everyday decision making. In response, the program is taking steps to make the plans more concise, linking to other reports where feasible, rather than "regurgitating" the information from other sources. The need for streamlining the plan format is heightened by the fact that the current plan production is behind schedule and out of sync with permit issuance, as a result of time lags associated with staff and leadership changes. In 2007, the program also experimented with making the plans available in a Google Earth interface that is easier to update on an ongoing basis, but there have been technical difficulties in their work with

contractors to achieve this. Thus, the future format of basinwide plans for the fourth cycle and beyond is still being explored and developed.

The program has been challenged by staff turnover, with each five year cycle bringing a new group of basin planners who are starting from scratch in learning about the basin, the agency programs, and the plan development process. There has been very little documentation and written guidance regarding what the role involves, so the planners mostly have to figure it out as they go, with the last basinwide plan as their main reference. The steep learning curve has been frustrating for the basin planners, as well as for some of the program and regional staff who have to reorient each new planner to how the programs work and reestablish mechanisms for communication. While the 5-year cycles are meant to build an increasing knowledge base over time, the basin planners do not really have a full grasp on the role until the end of the cycle, at which point they have tended to move onto other positions in the agency. This may be in part because the modest pay grade of the position, combined with the heavy workload, makes it more of a stepping stone for promotions to other agency positions. In response to internal feedback regarding these challenges, the program has been developing a new guidance document describing how basin planning currently operates – the first update since the 1991 framework document – and is looking at ways to improve training and cross-program communication mechanisms for basin planners.

One other key area that the basin planning recognizes a need to address is public involvement and engagement with basin stakeholders. For the last few years, the program has not been holding public workshops or meetings associated with basin plan development. Rather, input has been solicited through email to stakeholder organizations and formal public comment processes, as well as meetings with specific groups that request it, which tend to be environmental organizations. However, the 1998 Clean Water Responsibility Act called for public involvement in development of the plans to be *increased*, with public meetings conducted across the state. This issue was raised by some stakeholders who were frustrated that public meetings did not happen regarding the

Neuse basinwide plan update around 2007-2008. The agency is currently trying to figure out an effective mechanism for public involvement, given some of the challenges with earlier efforts and current resource constraints.

Beyond public meetings, the basin planners would like to have time to interact more with basin stakeholders and work on watershed improvement strategies. It is hoped that the basin planners can get more involved with the Use Restoration Waters program, covered in Section 4, which facilitates collaborative restoration efforts in small priority watersheds. However, some significant shifts to simplify the basin plan development process and/or bolster resource allocation will need to happen for basin planners to be able to take on any additional coordination roles, given their intensive current workload to just keep producing the plans and catch up with the plan schedule. Navigating the transition period between basin planning as it has been practiced for 15 years and what it might become has been a difficult process, fraught with role ambiguities and an array of existing and new demands that the team is not yet set up to address. Nonetheless, there are important opportunities to revamp the program and strengthen its strategic focus and impact as an integrating management tool, if sufficient resources and cross-program cooperation are devoted to the task.

### **5A.3 Nutrient Management Strategies**

The development of nutrient management strategies at the basin or watershed scale has been the agency's second major watershed approach strategy, occurring during the same time period as basinwide planning but with a regulatory focus. Given the valuable economic and ecological benefits of its coastal resources, nutrient pollution has been the focal water quality problem in the state. Nutrients such as nitrogen and phosphorus accumulate in reservoirs and estuaries from diverse point and nonpoint sources that must be addressed at a watershed scale. In 1979, prompted by harmful algal blooms and fish kills occurring in North Carolina's waters, the EMC established a Nutrient Sensitive Waters classification for waterbodies with problems related to excess nutrients. This classification has served as a critical legal basis for implementing

regulatory strategies to control nutrients and was first applied to all waters in the Chowan River basin in 1979. In the late 1980s, several other basins in the state were given this classification, including the Tar-Pamlico and Neuse Rivers. This special status has been a major driver of innovative regulatory strategies to control nutrients in the 1990s and beyond. The evolution of nutrient management strategies in North Carolina is a rich and complex story that cannot be fully captured in the scope of this case; this brief review captures some of the highlights of the story, with emphasis on the Neuse River basin.

The Tar-Pamlico river basin was the first to receive significant attention for development of a comprehensive nutrient management strategy, resulting from its 1989 nutrient sensitive waters classification, which was prompted by a spate of estuary fish kills in the mid-to-late 1980s. The agency's initial strategy proposed strict new limits on point source discharges, which were opposed by dischargers concerned about the high cost and the lack of controls for nonpoint sources (Anderson, 2000). In response, the agency worked with dischargers and stakeholders to develop a Phase 1 agreement covering 1990-1994 with a more flexible trading-type framework. The framework allowed a group of dischargers, the Tar Pamlico Basin Association, to meet a collective annual combined nitrogen and phosphorus cap in the most cost-effective manner. The Phase I cap was set based on technology limits of the day while estuary data collection and modeling were conducted. The Association and individual dischargers would pay a fee for any cumulative loading above the cap to the state's Agriculture Cost Share Program for cost-effective implementation of agricultural BMPs to offset the excess nutrient loadings.

Technically, the program was more of an exceedence fee program with subsequent agricultural incentive payments than a pure "trading" strategy, but the program was widely touted by EPA at the time as one of the first innovative watershed trading approaches in the country. The Association was given flexibility to negotiate, manage, and monitor the allocations among the dischargers with minimal agency involvement provided they met the requirements. In practice, the Association was able to

stay below its cap throughout implementation, so no fees were paid to implement nonpoint source control measures. The Phase 2 agreement (1994-2004), used a similar strategy but with new, separate nitrogen and phosphorus caps based on estuary goals for the entire strategy of 30% reduction of nitrogen and holding phosphorus levels constant from 1991 levels. These strategy goals were established using the estuary model that was funded by the Association through an EPA grant.

#### Neuse Basin Nutrient Strategies

In 1995, policy attention shifted to the Neuse River basin, where nutrient runoff from heavy spring rainfalls followed by a long hot, dry summer resulted in several major fish kills. Media attention fueled public concern over the potential health risks from outbreaks of the toxic dinoflagellate *Pfiesteria piscicida* that had occurred in the estuary. In response, the legislature passed a 1995 bill which required the EMC to establish a new set of nutrient rules to achieve the following goal:

...to reduce the average annual load of nitrogen delivered to the Neuse River Estuary from point and nonpoint sources by thirty percent (30%) of the average annual load for the period 1991 through 1995 by the year 2001, with incremental progress demonstrated each year” (NC SL1995-572 [HB1339])

In 1996, the EMC released a proposed nutrient strategy and held four public hearings which were attended by over 600 people (NCEMC, 1998a). The rules were substantially changed based on public input, and in 1997 two public hearings were held to gather additional public input on the revised rules. After subsequent revisions, the new rules covering point and nonpoint sources were adopted in 1997 and became effective August 1998, with a few exceptions noted below (NCEMC, 1998b). The far-reaching regulatory actions reflected a major shift in distributing accountability for addressing nutrient pollution and reflected “thousands of hours of staff time have been dedicated to holding workshops, public hearings, collecting and assessing water data, and crafting the new rules” (NCEMC, 1998a, p.1) Although the rules were controversial among those regulated, agency managers noted that high media attention and public demand for more protective policies at the time provided sufficient political fuel for the changes.

The Neuse Nutrient Management Strategy included a wastewater discharge rule to implement the required 30% nitrogen reduction from point sources in the basin (NCEMC, 1998b [15A NCAC 02B .0234]). The rule affected 111 NPDES dischargers, with new nitrogen permit limits focused on the 34 largest dischargers (at or above .5MGD) which represented 95% of the point source nitrogen contribution to the estuary (NCEMC, 2009). Similar to the Tar-Pamlico strategy, the rule gave dischargers the option of forming a compliance association to meet a collective nitrogen load allocation through trading among point sources. If the group cap was exceeded, or if new or expanded discharges needed allocation beyond what they could purchase from existing dischargers, offset payments would be made to the Wetlands Restoration/Ecosystem Enhancement Program. If new or expanded discharges needed allocation beyond what they could purchase from existing dischargers, they could likewise make payments sufficient to offset 30 years of discharge.

The Neuse trading strategy was designed differently from the Tar-Pamlico, with significant direction from EPA to incorporate individual accountability mechanisms that would facilitate enforcement action as needed if the group cap was exceeded. The trading strategy was implemented through a watershed-based NPDES permit, which provided more regulatory accountability than the Memorandum of Agreement that was used in the Tar-Pamlico. In 2002, the Neuse River Compliance Association formed to pursue the group permit and trading option. Most of the permitted entities in the Association had been already working together to coordinate monitoring activities through the Lower Neuse Basin Association. After several years of getting the technical details of the load allocations and trading mechanisms straightened out, the group NPDES permit and trading strategy went into effect in 2003.

The 1997 Neuse strategy took a major regulatory stride beyond prior point source nutrient controls by adopting new nonpoint source rules for agriculture, stormwater, nutrient management, and riparian buffers. The Agriculture Rule applied to all agricultural operations in the basin and gave two options for achieving the 30% nitrogen

load reduction (NCEMC, 1998b [15A NCAC 02B.0236]). Option 1 was to participate in a Local Nitrogen Reduction Strategy with collective implementation goals. To facilitate this collective approach, the rule established a Basin Oversight Committee composed of representatives from the agriculture, environmental, and scientific communities and several nonpoint source related agencies. The Committee's key responsibilities included developing a method to track nitrogen loadings and reductions from farms, allocating reduction goals for each county/watershed, reviewing and approving county/watershed reduction strategies, and reporting annually on these activities to the EMC. Local Advisory Committees were also created, with local agricultural agency nonpoint source staff and at least 2 farmers, to develop local strategies to meet county reduction goals. This involved conducting a sign-up process for farmers developing BMP implementation objectives to meet the reduction goals, and recruiting enrolled farmers to implement the BMPs with support from various cost-share funding sources. Farmers who did not sign up for local strategies were required to use Option 2, the Standard Best Management Practice Strategy to implement one of several combinations of practices such as riparian area protection, water control structures, and nutrient management plans.

The Neuse Stormwater Rule primarily addressed nutrient loadings from new development activities and applied to 10 municipalities and 5 counties which represented the largest and fastest-growing jurisdictions in the basin (NCEMC, 1998b [15A NCAC 02B.0235]). The rule required the jurisdictions to develop and implement an approved stormwater program that included review of stormwater management plans for new development, protection of riparian buffers, public education action plans, removal of illegal discharges, and identification of potential retrofit projects that could be funded through the Wetlands Restoration Program or other mechanisms. The rule implemented the 30% nitrogen reduction goal by requiring new development activities to meet a specified nitrogen export limit through a combination of site design and best management practices. Developers with exports under a certain threshold had the option to meet the remainder of the requirement through an offset payment to the Ecosystem Enhancement



Program. Sites above the threshold had to do onsite practices to achieve the threshold before “buying down” the remainder through the offset program.

Two other new policies applied across land uses in the Neuse basin, one fairly straightforward rule for fertilizer management practices and a riparian buffer rule that was more complicated and controversial. The Nutrient Management Rule required that those who are applying nutrients to 50 or more acres of residential, agricultural, commercial, recreational, industrial property must attend nutrient management training or develop nutrient management plans for their land within five years of the rule’s adoption (NCEMC, 1998b [15A NCAC 02B.0239]). The Riparian Buffer Protection rule was based on the rationale that forested riparian buffers have been found to reduce nitrogen entering waterways by 50-80% (NCDWQ, 2010a). At the time the rule was passed, around 70% of the Neuse basin had forested riparian buffers and it was estimated that losing half of these buffers would increase nitrogen loading by 17%, a major step in the wrong direction. The rule required that a 50 foot vegetated buffer be protected in existing forested riparian areas and did not apply to areas where the riparian area had already been cleared for lawn, buildings or other uses (NCEMC, 1998b [15A NCAC 02B.0233]). The first 30 foot zone of the buffer nearest the water was to remain relatively undisturbed, while the landward 20 foot zone had vegetation requirements with additional allowed activities. Due to considerable controversy surrounding the buffer requirements, the 1998 General Assembly disapproved the EMC’s 1997 temporary rule and called for changes which were incorporated into the permanent buffer rule that went into effect in 2000.

The state-mandated nitrogen reduction and nutrient strategies for the Neuse basin predated any TMDL activity in the basins. After the 30% nitrogen reduction goal was set, the state funded a comprehensive Neuse modeling and monitoring project to quantitatively assess the linkages between nutrients, phytoplankton and dissolved oxygen in the estuary. The modeling efforts were used to generate a TMDL for the Neuse estuary in two phases. The second phase TMDL, approved by EPA in 2002, focused on meeting *chlorophyll a* standards and concluded that the current 30% nitrogen reduction goal

established by the state was sufficient to achieve standards (NCDWQ, 2001). Thus, state policy, more so than CWA TMDL requirements, has been the primary driver for the progressive nutrient management policies in the state. Since the Neuse rules, the modeling to generate TMDLs has been folded into the agency's process of developing nutrient rules in other basins and watersheds where there is a state mandated reduction.

#### Evolution and Assessment of Nutrient Strategies

The Neuse nonpoint source rules have become the model for other nutrient sensitive watersheds in the state, although more recent rounds of rulemaking have expanded on the rules somewhat. In 2000-2001, similar nonpoint source rules were adopted for the Tar-Pamlico basin with some adjustments, including additional phosphorus control measures to meet the Tar-Pamlico's 1995 Phase II agreement to hold phosphorus loading to 1991 levels (NCDWQ, 2010b). A stakeholder involvement process was begun in 2003 to develop rules for point and nonpoint sources to reduce nitrogen and phosphorus loadings in the Jordan Lake reservoir, a nutrient sensitive watershed in the Upper Cape Fear River basin. The protracted and controversial rulemaking process, which involved the General Assembly revising and adopting the final rules in 2009, resulted in rules similar to those in Neuse and Tar-Pamlico but with several key additions, including:

...stormwater requirements for all local governments in the watershed, local implementation of buffer rules, a rule requiring local governments to achieve loading reductions from existing developed lands, a separate stormwater rule for state and federal entities, and a separate rule outlining a trading framework to maximize options for cost-effective reductions. (NCDWQ, 2010c)

Overlapping the Jordan rulemaking effort, in 2005 the state legislature mandated development of a nutrient strategy for the Falls Lake watershed in the upper Neuse River Basin. The mandate was motivated by concerns over the impact of a proposed allocation trade between facilities in the extreme lower and upper Neuse Basin on the water supply for the City of Raleigh. It has resulted in the most intensive nutrient strategy development process to date, driven by a deadline for rules adoption of January 2011

(NCDWQ, 2010d). The proposed rules incorporate all of the new elements included in the Jordan strategy, but involve significantly more stringent reduction needs based on lake modeling results. In the latter respect, they present the most challenging management questions to date.

By 2003, all of the Neuse nutrient rules were being implemented, and point and nonpoint source entities were reporting annually on implementation progress (summarized in NCEMC, 2009). As of 2006, the nitrogen load reported by point source dischargers was 65% lower than 1995 levels – thus they were successful in going far beyond the 30% reduction required. Moreover, the Neuse River Compliance Association achieved a 70% load reduction in spite of the fact that wastewater flows had increased by 23%. Under the agriculture rule, the Basin Oversight Committee reported in 2006 an estimated 45% nitrogen loss reduction from the 1991-1995 baseline, achieved through best management practice installation, fertilizer application reduction, and cropland acreage reductions. Stormwater programs were being implemented by the 15 covered jurisdictions and through the nitrogen runoff requirements for new development, 1338 nutrient offset payments were made to the Ecosystem Enhancement Program. Nutrient management training sessions were held for 1850 fertilizer applicators in 2000-2001. Buffer rules were being implemented by DWQ regional offices, except in cases where the program was delegated to the local government. Despite initial pushback and controversy in getting the rules adopted, implementation seemed to be proceeding fairly smoothly.

The first field test of effectiveness did not come until monitoring and assessment data were synthesized for the update to the Neuse Basinwide Plan, scheduled to come out in 2007. The monitoring data only covered the 2003-2006 period, so it was a very early diagnosis; however, the diagnosis was not good. The data showed no reduction in the estuary's impairment, and in fact the impaired acreage had expanded somewhat in the lower part of the estuary. One DWQ study conducted at a TMDL compliance point in the basin for the 1991-2006 period found no significant trend in nitrogen loading. Another DWQ study comparing pre-implementation (1991-1996) to post-implementation (1999-

2006) found an increase in nitrogen loading of around 11%, rather than the intended 30% reduction. The 2009 Neuse Basinwide Plan notes a number of potential limitations of the studies in accurately depicting progress in such a complex ecological system. However, the data that do exist raise a number of questions surrounding the ability of the Neuse rules to meet their intended outcome.

In developing the updated Neuse Basinwide Plan, program managers have been discussing the implications of the findings for the Neuse rules. The reductions from point sources are the most straightforward and easily quantified. In fact, one recent study that was conducted found that the forms of nitrogen associated with point sources had decreased over the time period that controls had been implemented, but that nitrogen associated with wet weather flows had increased during the same time period. Among the nonpoint source rules, the agriculture and new development stormwater rules were the only ones that had specific mechanisms to account for the 30% reduction, but there have been many questions surrounding what the policies have actually achieved. Factors that contribute to the fuzziness in quantifying agriculture reductions include:

...the relative variability of nonpoint source BMP effectiveness, the inherent uncertainty of the baseline nitrogen loss estimates which current reductions are compared against, and the fact that reductions reported for agriculture are edge of field reduction estimates and not in stream load reduction calculations based on water quality monitoring data (NCEMC, 2009)

As for stormwater, based on the way the accounting tool for site nutrient export limits played out, most of the residential development sites did not have to do onsite reductions but rather could make payments to the Ecosystem Enhancement Program for offsite reductions. There has been some uncertainty surrounding what this program counts as a reduction and whether it is truly offsetting nitrogen loading to the extent intended. Another limitation of the Neuse rules was that they did not address stormwater from existing developed lands, a limitation that has been addressed, despite strong opposition, in the subsequent Jordan strategy and in draft rules for the Falls Lake watershed in the upper Neuse Basin.

The public release of the draft Neuse Basinwide Plan conveying the discouraging report of no measurable progress was controversial among stakeholders. Municipalities in the basin, foremost the City of Raleigh, responded with a number of questions and issues that they wanted to see addressed in the plan. They wanted clearer strategies spelled out, pointing to the 1998 Clean Water Responsibility Act's requirements that basinwide plans include an action plan to achieve reductions in the 5 year planning horizon. One manager summed up the sentiment among point source stakeholders who:

...feel like they've done their job and want to see everyone else held to account. They were scrutinizing all of our assessments in the basin plan, wanting to see more definitive outcomes and action plans with specific timeframes, actors and intended outcomes.

Some point source stakeholders have called for further investigation of potential sources not covered by the rules, such as atmospheric deposition and groundwater, which trace back to agriculture and air emissions sources such as electric power facilities, vehicles, and other combustion sources. Another issue raised by stakeholders when the draft plan came out was that DWQ had not hosted public meetings to get input on the plan, as had been done in earlier plan cycles, or publicized the draft plan broadly and early enough for stakeholders to prepare substantive feedback.

The feedback that came up around the draft Neuse Basinwide Plan challenged the planning staff at DWQ to reassess the role and direction of basinwide planning in the agency. Previously, basinwide plans presented assessment data for watersheds, summarized program information and local initiatives, and concluded with general policy recommendations to address issues. The plans stopped short of garnering a coordinated strategy among programs and agencies with specific commitments. In some ways, this had been a purposeful separation of functions - basinwide plans were for providing comprehensive information that can drive policy efforts, but rulemaking was needed for actually setting substantive policy. The 1998 legislation that required an action plan for nutrient sensitive waters also specified that the Basinwide Plan is not a rule and that new policies to implement the plan must go through the formal rulemaking process (NC SL

1997-458). When asked about whether prior basinwide plans set forth actions to be implemented, one manager responded:

There were always recommendations, but I don't know that they were disseminated out to the other programs to do something about them. The intention was there but I don't think there was the driver. The planners had one basin after another and it's hard to follow through on all the things you're recommending when you're doing all these other things, and there's no demand to achieve them.

Thus, to create the required action plan, the Neuse basin planner was charting new territory in trying to bring DWQ staff together from all the relevant programs to look at possible gaps in the program strategies and agree to commitments and timetables. Regarding commitments, particularly with the agency's complicated stormwater programs, "we had trouble getting people to agree to say 'we will do this' but rather, 'we'll talk about doing that by that date.'" Eventually, an action plan was hashed out and the final draft basinwide plan was released and approved by the EMC in 2009, two years behind schedule (NCEMC, 2009). One manager summarized well the challenges surrounding the action plan development process:

The reassessment was not satisfying from my standpoint because we didn't have the time to devote to it. It's frustrating to get all these questions and want to put more time into it but not be able to. So, we haven't committed ourselves to anything in particular. There are rules we could be amending or adding with time but we're not ready for it, manpower-wise. And, in internal discussions, we've struggled with some of the issues of what to do. It needs to be fairly well planned and surgical, when you open a rule to amend it the entire rule is exposed to being revised by all parties, so we have to be judicious about it. And some of it requires coordination across agencies.

A critical challenge ahead is figuring out how to balance the intensive workload of required rulemaking and implementation processes for *new* nutrient strategies with an effective means to reassess and revise *past* nutrient strategies that have reached "steady state" implementation. More staffing devoted to the task will be required to achieve adaptive management of the new and existing nutrient strategies.

#### **5A.4 Use Restoration Waters Program**

In the last decade, DWQ has developed another watershed approach strategy to focus on local collaborative efforts in small watersheds in coordination with EPA Region 4's priority watershed focus. The Use Restoration Waters (URW) Program was initially created by DWQ in 1995 to obtain a special supplemental classification for impaired waters which would enable rulemaking to require action to restore these waters to their designated uses. In 1999, the EMC approved the program under different terms, deeming the supplemental classification unnecessary. At the time, the URW program was envisioned as having two pathways – it would provide voluntary incentives for local stakeholder committees to do projects to improve impaired waters; or, if local stakeholder efforts were lacking, mandatory nonpoint source rules would be put in place to address impairments. The program was not carried out in this form due to issues with budget and staffing.

In 2004, a new staff coordinator came on board with the task of reviving and redefining the program's direction to further local restoration activities in impaired watersheds. Fortuitously, the revival coincided with EPA Region 4's 2005 reorganization and new focus on working with states to get measurable water quality improvements in priority watersheds. DWQ's URW coordinator and Region 4's state watershed coordinator worked closely together to get the program going in local watersheds around the state. The revamped URW program was designed with three main goals: 1) prioritizing waters for restoration, 2) promoting and supporting restoration initiatives, and 3) improving documentation and recognition of restoration efforts in watershed initiatives.

The need for prioritization “stems from the great number of impaired waters, the limited funds available for restoration work, and the time-consuming and technically and organizationally challenging nature of watershed restoration work” (internal program document). One factor used to prioritize was the areas where special studies had been already conducted to assess watershed conditions and pollutant sources beyond the

agency's regular monitoring process. For example, a number of focused watershed assessments had been funded across the state through the Ecosystem Enhancement Program and Clean Water Management Trust Fund to identify areas for restoration projects. Another main selection factor was the presence of a strong stakeholder presence who could serve as a local champion to advance the watershed restoration initiative. The URW program worked with basin planners, the Ecosystem Enhancement Program, Division of Soil and Water Conservation, and others to find areas with active local stakeholder efforts that were conducive to on-the-ground restoration work. The stakeholders identified were interviewed to identify some areas with strong local capacity to begin collaborative watershed initiatives. The program started with three or four of these priority areas – termed “restoration watersheds” to distinguish them from a prior agency designation of priority watersheds – and expanded over time to around 12-13 watersheds in 2009.

Once restoration watersheds are defined, the URW program promotes and supports watershed restoration initiatives following the general 4-phase model that EPA Region 4 adapted from TVA (explore, build and prepare, implement, transition to maintenance). The URW program coordinator and Region 4 state watershed coordinator serve as Restoration Watershed Program Coordinators for the state, playing various facilitation and assistance roles to help build skilled restoration teams in the watershed initiatives. Local champions serve as the project leaders, convening a support team of primary and secondary partners that include some combination of local government, conservation districts, state and federal agencies, and nonprofit organizations. The role of primary and secondary partners, though not necessarily formally designated, is to connect the restoration project with sources of technical, financial, and political support. In restoration watersheds where stakeholders request it, the URW coordinator and basinwide planners assist in developing a watershed restoration plan for the project. It is envisioned that as the project moves into implementation, more of the responsibilities



will be carried out by the local champion and partners, with the Division still being an active presence.

The third goal of the program is to better monitor, document, and promote the positive outcomes of watershed restoration efforts. The URW program coordinators and agency support partners assist in making sure the monitoring is in place to be able to measure water quality improvements. As part of its general programmatic funding from EPA, the Division has committed to achieving and reporting on one SP-12 watershed improvement each year, as well as water quality improvements in impaired waterbodies under SP-10 and SP-12. Through the URW program, DWQ was able to report one watershed improvement each year in 2008 and 2009.

Building on the URW model, in 2007 the DWQ's Director charged the agency's seven regional offices to each "adopt" an impaired watershed and collaborate with local partners on restoration activities. Regional offices are in many ways positioned well for local restoration work since they serve as the agency's "eyes and ears" in watersheds, performing water quality monitoring, permitting and compliance inspection duties. Some regional offices have enthusiastically risen to the restoration task while others have been more hesitant or faced challenges in incorporating the new role. To clarify the process and expectations surrounding regional initiatives, the URW program has since developed guidance that explains the roles of local champions, agency managers, and other partners in the 4-phase restoration process used by Region 4 and DWQ (covered in Chapter 4). The guidance defines the regional office role as helping to bring new champions to the table through established relationships in the community and supporting the initiatives in several ways:

1. Follow up on compliance concerns raised by local Champions
2. Use Watershed Restoration process as a means to prioritize execution of core responsibilities (inspections, compliance & enforcement, permitting).
3. Provide additional assistance (i.e., monitoring, streamwalking, etc.) to further watershed restoration effort when RO resources allow. (internal document)

In 2008, DWQ, in partnership with a facilitation consultant who had EPA funding to apply to the task, convened a group of agencies to explore opportunities for greater coordination on watershed restoration activities. In North Carolina, there are many agencies working independently on different programs related to watershed protection and restoration. Typically, there has not been a mechanism for the agencies to regularly meet and coordinate actions and priorities in particular watersheds, apart from the nutrient rule implementation processes. In the meeting, the agencies each shared perspectives regarding the challenges related to watershed restoration efforts that might be better address through working together more closely. The agencies have since been interested in continuing to pursue coordination opportunities.

The URW coordinator was originally in the agency's nonpoint source program but was moved to the basin planning unit, in hopes that the basin planners could become more integrated into this kind of work with stakeholder groups. In recent years, so much of the basin planners' time had gone into synthesizing information to keep producing the basinwide plans on schedule. They would like to be working more with local stakeholder efforts, but have not had the time or travel funds to do so. It is hoped that if the basinwide plan format and development process can be streamlined somewhat, then more of the basin planners time could go to supporting and accelerating the local watershed initiatives of the URW program.

## **5A.5 Reform Outcomes**

This section summarizes and discusses some of the accomplishments and challenges of the agency's watershed approach strategies, in relation to the four reform dimensions of this study. Additional discussion of key issues as they relate to the EPA context, other state cases, and the reform literature is provided in Chapter 6.

### **Integrated Management**

Basinwide planning was the agency's first effort to institute an integrated approach to managing water quality at a large river basin scale. The initial focus was to

better integrate monitoring, modeling and NPDES permitting at the basin scale to make permitting decisions that better addressed cumulative impacts and assimilative capacity of the basin system. This linkage has grown weaker to some degree over time as the schedule for producing basin plans has fallen behind the permitting schedule, but it appears that the agency is aiming to catch up with the original 5 year benchmarks so that these will be more aligned. In addition to the water quality assessments, the basinwide plans do provide a fairly comprehensive summary of basin information such as land cover change, population growth, wastewater facilities, stormwater jurisdictions, animal operations, natural resources, wetlands, water supply, numerous federal and state nonpoint source programs, and other local initiatives.

The plans have not really extended beyond information exchange and synthesis to foster program coordination and integrated decision making among internal DWQ programs and other agencies and stakeholders. To generate each new plan, basin planners seek updated information from various DWQ programs and the regional offices, as well as from other external programs. Although the basin planners see a great need for more ongoing internal and external coordination, they have little time to do this because they are struggling to catch up and keep up with the plan production schedule. They also often find it difficult to get program and regional staff and other organizations to invest more time and attention in the basin planning process. Since coming into the role in 2008, the current basin planning supervisor has been meeting with a number of internal and external programs and exploring steps to build stronger communication and coordination. For example, the program has begun conversations with the Division of Water Resources, which implements a separate water supply planning program that has had virtually no connection with DWQ's basin planning. It is yet to be revealed how these initial bridge-building steps with other agencies might impact the basin planning function going forward.

The state-mandated nutrient management rules for the Neuse River and other areas have been a much stronger driver for integrated policy action to address point and

nonpoint sources at the basin or watershed scale. The Neuse and Tar-Pamlico rules are designed to specifically address the problem of nutrient loading from multiple sources over a large geographic area to improve conditions in the estuaries at the end of the river systems. More recent nutrient rules focus on somewhat smaller scales, addressing the watersheds surrounding Jordan Lake and Falls Lake. DWQ staff from different programs who worked on the rules had to coordinate efforts in order to forge a comprehensive policy strategy according to deadlines and requirements set by the state legislature. This was likely facilitated by the fact that each program area was responsible for developing its strategy to meet the same 30% reduction target – it was not the potentially contentious issue of allocating the reductions differentially among sources (e.g. agriculture should get a 50% reduction while stormwater only needs 20%).

#### Collaborative Management

Basinwide plans were intended to provide a comprehensive picture of water quality issues and trends for the general public, policy makers, and the regulated community. In the original basinwide framework document, there was little discussion of the role of ongoing public participation and collaboration among agencies and stakeholders to develop policy solutions. Rather, the agency would collect and assess the data, develop management strategies, and present these in draft form for comment at public hearings. The role for public involvement was expanded somewhat through public workshops, first facilitated by the Cooperative Extension Service then later by the agency, which presented water quality data then gathered public input on issues and strategies prior to drafting the basinwide plan and formally releasing it for public comment. The workshops, though limited to 1-3 per basin per 5 year cycle, did provide a forum for interested agencies, stakeholders, and the public to discuss and exchange information regarding issues in the basin. However, the agency stopped holding the public meetings when the basin workshops turned hostile with angry constituents shifting the agenda from basin planning to proposed buffer rules. As nutrient rules were expanding the agency's regulatory force in some areas of the state, perhaps it was

becoming more difficult for the agency to play a neutral, collaborative role in public forums.

While public involvement in basinwide planning has generally not been charged with the interest and potential controversy that often surrounds policy action, the nutrient rulemaking processes have been more of a hotbed for stakeholder engagement. Figuring out how to effectively incorporate stakeholders in the agency's rulemaking has been an evolving, experimental process, fraught with many challenges. For the first set of rules in the Neuse basin, public input workshops and hearings were held but the tight timeframe did not allow for substantive stakeholder participation in developing the policies. In the Tar-Pamlico rules, the agency started experimenting with stakeholder consensus building, with bi-weekly meetings of eight different stakeholder teams over three months. The process ended up being more overwhelming than productive.

For the Jordan Lake rules, a fairly effective stakeholder process was co-facilitated with DWQ and a regional Council of Government process for over a year and a half. However, after a long process of revising the rules to align with the stakeholder consensus, letters of opposition in the formal public comment process caused the rules to be elevated to and revised by the General Assembly with another round of stakeholder process. Although many of the strategies in the original rules were adopted, the process left a sense of failure and frustration surrounding stakeholder consensus efforts. The agency is experimenting again in the most recent Falls Lake rules, though the stakeholder process is much more truncated than they would prefer because of the timeline mandated by the state legislature.

DWQ's recent focus on restoration at the local level, through the Use Restoration Waters program and related regional office initiatives, reflects the agency's most collaborative strategy to date. The strategy recognizes that local champions and agency-stakeholder partnerships are the driver for water quality improvements in impaired waters, particularly for addressing nonpoint sources. The agency aims to play a support role, facilitating in the early stages to get the collaborative effort going and then helping

to the extent feasible with monitoring, writing watershed plans, and other types of assistance. The collaborative orientation is also reflected in the extent to which the program has partnered with EPA Region 4 to make progress in the priority watersheds. However, it is important not to oversell the extent of this collaboration – the agency has only one staff person dedicated to the URW priority watersheds and the regional offices have varied in their enthusiasm to embrace this new collaborative role.

### Adaptive Management

The basinwide planning framework predated use of the term “adaptive management” by EPA and the state agency by about a decade, but some of the principles are inherent in its initial design. Ultimately, the program aimed to more comprehensively monitor and model water quality dynamics at the largest system level, the river basin, and then use the findings to develop and implement management strategies for point and nonpoint sources. The 5-year iterative cycle would keep feeding new monitoring data on conditions into the basinwide plans and management strategies could be adjusted as needed to ensure the strategies were working. While the cyclical monitoring and assessment process has been achieved and been useful to an extent, the plans have lacked explicit management strategies which are implemented and monitored as part of the basinwide process. Thus, the potential of adaptive management’s structured “learning by doing” is constrained by the basinwide plans’ lack of implementation actions which are monitored and adjusted over time.

Adaptive management has emerged to some degree around nutrient management strategies. In the Jordan Lake rules, stakeholders wanted to build an adaptive management provision into the rules so that if monitoring results showed that the rules were more than enough, then the terms could be lightened somewhat. The agency had to negotiate on this point that the reverse would also be true – rules might need to be strengthened. Ultimately an adaptive management strategy was built in and will likely be also included in the recent Falls Lake rules, though there is some question of whether the

state's rules review committee will allow for adaptive management elements that leave potential future requirements unspecified.

The Neuse Basinwide Plan update in 2009 was, in a sense, an adaptive management wake-up call. The state had mandated a 30% reduction in 5 years, the agency had implemented a package of landmark new rules for nonpoint and point sources to achieve the reduction, the rules had seemingly been implemented as designed, but the early water quality data showed no improvement. What now? Beyond the cross-program meetings that were required to develop the modest action plan commitments for the Neuse basinwide plan, program staff have been so consumed with new rounds of rulemaking and other program responsibilities that the resources to evaluate and revise past strategies in the Neuse and Tar-Pamlico basins are hard to come by. Nonetheless, one manager noted the process of experimentation, learning, and adaptation that has evolved with each new round of watershed rulemaking. The more recent Jordan Lake and Falls Lake rules build on some of the gaps and lessons learned from implementation of the Neuse rules.

#### Results-Oriented

While the basinwide planning program was not designed to pursue specific outcome targets, the state's nutrient policies are driven by very clear targets, such as a 30% reduction in nitrogen loading in the Neuse basin. DWQ was one of the first agencies in the country to support greater flexibility in allowing wastewater dischargers to meet collective outcome targets through trading-like arrangements. The results have been good from the perspective of DWQ and dischargers – in the Neuse the group compliance association achieved almost double the required reduction in nitrogen levels.

Environmental advocacy groups in the state, however, have generally been critical of the water quality trading approach and feel that the reduction requirements should be stronger to address loading in the state's estuaries. One high profile issue that came up early in the Neuse trading scheme was a proposed trade between dischargers in the lower and upper end of the Neuse basin. The trade was necessary for expansion of the upstream

discharge but would have resulted in a dramatic increase in nitrogen to Falls Lake in the upper Neuse, which supplies the City of Raleigh with drinking water. Outcry among stakeholders led the Falls Lake discharger to withdraw its expansion request until the agency could undertake a thorough investigation of nutrient loading in the reservoir. This later resulted in the agency's most stringent nutrient reduction requirements and rulemaking process yet. Thus, although trading continues to be applied in each set of the nutrient rules, the approach has not been without important implementation questions, challenges, and opposition from some environmental stakeholders.

The nonpoint source rules for stormwater, agriculture, fertilizer management, and riparian buffers are much more difficult to track and quantify in terms of achieving results. The lack of measurable water quality improvements in the Neuse estuary so far suggests several possible conclusions concerning results-oriented management which are not mutually exclusive...that results are difficult to accurately measure, that they take much longer to materialize than a few years of implementation, that better accountability measures and possibly more stringent policies are needed for nonpoint sources, and/or that the bar needs to be set higher for dischargers, if they are so readily meeting and exceeding their targets. Despite these challenges, the approach has been successful in beginning to hold a much broader spectrum of entities accountable, such as local governments, developers, property owners, farmers, and fertilizer applicators, for actions to reduce nonpoint source pollution.

The Use Restoration Waters program is also a results-oriented strategy but at a much smaller watershed scale, aimed at specific actions to improve water quality in impaired streams. The program focuses efforts by defining priority watersheds where there have been more extensive watershed assessments conducted and where there is a strong local champion who can effectively lead a collaborative partnership to aggressively pursue restoration actions. The program works with EPA Region 4's state watershed coordinator to support the initiatives, monitor results, and hopefully produce at least one watershed improvement (EPA's SP-12 target) per year.



In addition to these efforts, the DWQ's Director initiated a major strategic planning process in 2008 to encourage more performance-oriented management of programs in the agency. The process has aligned with a new initiative of the Office of State Personnel's to assist state agencies in transforming to a more performance-based culture with clear goals, metrics of results, and employee evaluation in relation to results. The DWQ's "Transformation Project" used teams of staff to address strategic planning, communications, leadership development, talent management, performance management, and recruitment and retention. One of the products of this process has been the development of a set of core strategic goals and operational tactics, with specific targets, responsible entities, and timelines linked to strategic program outputs and outcomes.

## **Case Study B: Georgia's Watershed Approach Reforms**

### **5B.1 Introduction & Context**

This case study reviews the evolution of the Georgia Environmental Protection Division's (EPD) strategies to implement comprehensive watershed management on a statewide basis. In order to address the unique water resource challenges in the state, EPD's watershed strategies have generally encompassed both water quality and water quantity. The case begins in the early 1990s with the adoption of a river basin planning framework. After the first set of river basin plans were completed in 2004, Georgia adopted a new comprehensive state water planning process. The case reviews the development and early implementation of the state water plan, which was adopted in 2008 and set forth a new structure for integrated water planning by regional, stakeholder-based councils. In the middle years between these two state-mandated watershed planning frameworks, Georgia was one of the first states to face a massive federal court-ordered production schedule for TMDLs and TMDL implementation plans, as a result of litigation by environmental groups in the state. This introduction reviews some key elements of Georgia's environmental and institutional context which help frame the case study.

Of Georgia's 14 major river basins, five are contained completely within the state, while the rest of are shared with users in neighboring states. The Savannah River forms the state's eastern border with South Carolina. The Coosa and Tallapoosa Rivers start in north Georgia and flow west into Alabama to join the Alabama River system, draining to the Gulf of Mexico at Mobile Bay. The Chattahoochee River also originates in north Georgia and flows through the metropolitan Atlanta area before becoming the western state border with Alabama. At the state's southwest corner, the Chattahoochee joins the Flint River to form Florida's Apalachicola River. Water use conflicts with neighboring states and within different regions of Georgia have resulted from increasing demands among multiple, competing interests, exacerbated by periodic drought. Water allocation disputes between Georgia, Alabama, and Florida are largely driven by the fact that the

metro Atlanta region lacks a plentiful water supply. The Chattahoochee is the smallest river to supply a major metropolitan area in the country (Georgia River Network, 2010). Georgia's population grew by over 26% from 1990-2000, mostly concentrated in the metro Atlanta region, and this rate of growth is expected to continue (Georgia Water Council, 2005).

While the northern half of the state relies on surface water for supply, the southern half enjoys significant groundwater resources from several aquifers. Georgia utilizes portions of the massive Floridan aquifer, which is shared with Alabama, Florida and South Carolina. Groundwater resources are generally plentiful, but resource limitations have emerged in some locations. In southwest Georgia, major groundwater withdrawals for agricultural irrigation impact river flows in the Flint River basin during drought periods. Groundwater withdrawals have also contributed to saltwater intrusion problems in parts of southeast coastal Georgia, which is the second fastest growing region of the state. The interconnections between water usage and water quality, in river flows and in aquifers, have necessitated steps toward more integrated water management by EPD.

Policy action in Georgia to address water resource challenges has often coincided with periods of drought. Surrounding droughts in 1986 and 1988, municipalities in the metro Atlanta began negotiations with the Army Corps of Engineers to secure additional water allocation from Lake Lanier on the Chattahoochee River, and pursued other possible water supply reservoirs to make the region "drought proof" (Feldman, 2008). This prompted opposition from Alabama and Florida to protect downstream uses in the shared Apalachicola-Flint-Chattahoochee and Alabama-Coosa-Tallapoosa river systems. As these conflicts were emerging, the General Assembly passed legislation in 1991 requiring EPD to do comprehensive river basin planning for the state, starting with the Chattahoochee and Flint Rivers. Alongside EPD's basin planning efforts, the interstate "water war" continued to unfold with years of in-depth study and modeling by the Corps of Engineers and other parties, legal actions, and negotiations to determine an equitable

allocation formula to meet the many competing water uses of the three states. Although federal interstate compacts were signed by the states in 1998 to resolve the disputes, the parties had yet to agree to an allocation formula as of 2009. These complex disputes are beyond the scope of this case study and are well reviewed elsewhere (e.g. Feldman, 2008; O'Day, Reece & Nackers, 2009).

Another extended drought in 1999-2002, combined with water resource challenges in several regions of the state, prompted further action by the legislature to initiate a new statewide water planning process. The legislature established a Joint Committee to develop recommendations for state water planning. In the same year, the legislature also created the state's first regional water planning district, a 15-county area surrounding metro Atlanta charged with creating comprehensive plans for wastewater and stormwater management, water supply and conservation, and watershed protection. Based on the Joint Committee's recommendations, the legislature passed the Statewide Comprehensive Water Planning Act in 2004, which replaced river basin planning and charged EPD to develop a state water plan by 2008 using extensive stakeholder involvement. The stakeholder policy debate surrounding the state water plan's development was influenced by yet another severe drought which occurred in 2005-2007 and required temporary mandatory water conservation measures.

In Georgia, watershed planning and management activities have been led by EPD and its Water Protection and Water Resource Branches. EPD's Director decided in 2006 to merge the separate programs for water quality and quantity into a Watershed Protection Branch to enable more integrated water management. The branch contains all the federally delegated CWA and Safe Drinking Water Act programs, with the exception of the state revolving fund programs which are administered through the separate Georgia Environmental Facilities Authority. The branch also manages state programs for water withdrawal permitting, groundwater protection, and other functions. EPD has lead authority for nonpoint source management but has partnered with the Georgia Soil and Water Conservation Commission and Georgia Forestry Commission as lead agencies for

dealing with water quality problems from agriculture and forestry, respectively. Housed within the state's Department of Natural Resources, EPD is the main regulatory force in the state, also containing branches for air protection, hazardous waste, and land protection. At the time of this study, EPD has eight district offices covering compliance and enforcement for air, land, and water, which report directly to a Program Coordination Branch.

This case reviews the evolution of watershed approach strategies in Georgia in three main, somewhat overlapping phases. Section 2 covers the agency's initial adoption and implementation of river basin management planning from 1991-2004. Section 3 reviews actions since 2000 in the TMDL and NPDES programs to promote local watershed management, followed by a discussion of organizational changes since 2004 to promote cross-program integration. Section 4 summarizes the agency's process to develop a state water plan (2004-2008) and early implementation actions as of fall 2009, when research interviews were conducted. The concluding section reviews case findings relative to the reform dimensions of this study, with further analysis provided in Chapter 6.

## **5B.2 River Basin Management Planning**

### Design & Adoption

In 1992, Georgia's state legislature passed the River Basin Management Planning Act which started the EPD on the path of creating comprehensive plans for the state's 16 major river basins (O.C.G.A. 12-5-520, [SB637]). The Act charged EPD to appoint Local Advisory Councils, consisting of seven citizens and a chairman, to be consulted throughout development of the plan, with meetings at least once every four months. The basin plans were to comprehensively address surface water quality, including a description of the watershed, current and projected uses, hydrology, and water quality conditions; an identification of all governmental units with jurisdiction over watershed; a description of goals of the plan such as public education and water quality and habitat improvements; and a description of strategies to meet the goals. Each plan was to be

completed within five years from the start of development, with planning to start in the Chattahoochee and Flint basins (1992), the Coosa and Oconee basins (1993), and then one plan initiated per year thereafter until all were complete. Drafts of the basin plans would be released for public hearing and comment before being approved by the Board of Natural Resources. The Act stated that

...upon the board's adoption of a final river basin management plan, all permitting and other activities conducted by or under the control of the Department of Natural Resources shall be consistent with such plan.(O.C.G.A. 12-5-524)

The entire Act spelling out these requirements was all of two pages in length, so the challenge of giving structure and substance to the new basin planning process lay with the EPD. In 1993, the Local Advisory Councils for the first four basins were appointed. The council members and chairmen were selected by EPD from nominations submitted by constituent groups to represent a cross section of stakeholder interests, including local governments, agriculture, industry, forestry, environmental groups and landowners. In January of 1994, the four councils were convened to review and reach consensus on the EPD's proposed mission, goals, and objectives for the statewide basin planning program. As for the implementation structure to develop the plans, EPA provided a grant for EPD to hire the same consultant who had facilitated North Carolina's development of a basinwide planning framework. Although Georgia did not publish a framework document, as was done in the other case study states, the planning process was described in the state's water quality reports (305[b]) to EPA (e.g. GAEPD, 2004)

The consultant facilitated a series of meetings among a workgroup of representatives from the state's water protection, water resources, and wildlife resources programs to forge a structure and process for basin planning in Georgia. Through this process, EPD decided to extend beyond the Act's focus on surface water quality to also include groundwater, drinking water, and surface water supply. In the facilitated meetings, the workgroup developed an outline for the basin plans and crafted a rotating basin schedule similar to North Carolina's to align monitoring and assessment, plan

development, and NPDES permitting in a 5 year iterative sequence. This also went further than the requirements of the Act, because the schedule would eventually produce several basin plans each year rather than just one, and the plans would be updated with new data and stakeholder input every five years, rather than just being a one time snapshot.

In early 1995, a meeting was held to engage a larger group of agency partners in participating in the basin plan development process. A statewide basin planning team was formed to coordinate the development of the basin plans from all the agency programs that would be contributing content. The bulk of the team consisted of a manager and one support staff from each of the relevant programs within EPD's Water Protection Branch and Water Resources Branch that held a piece of the plan content (water quality data, permits, etc). The team also had representatives from the Wildlife Resources Division, Georgia Soil and Water Conservation Commission, Georgia Forestry Commission, and the federal Natural Resources Conservation Service who contributed content on activities, policies and programs related to agriculture and forestry. The US Geological Survey played a key role in providing land use data and mapping support. These pieces were woven into a basin plan outline of chapters that was consistent for all the plans developed (see plans, GAEPD, 2010a):

1. Introduction
2. Basin Characteristics (physical/biological, population/land use, jurisdictions)
3. Water Quantity (drinking, surface, groundwater supply and permitting)
4. Environmental Stressors (water quality)
5. Assessments of Water Quantity and Quality
6. Concerns and Priority Issues
7. Implementation Strategies
8. Future Issues and Challenges

### Implementation

Several organizational changes were made to implement the new framework, although there was not a reorganization or major shifting of roles and responsibilities. Two new positions were created to coordinate the basin planning process, one in the

Water Protection Division and one in the Water Resource Division. The coordinators managed regular meetings and communication with the basin planning team to make sure that all the information pieces from different program areas came together for the basin plan document. To implement the rotating basin schedule, the Water Protection Division reoriented from the fixed station monitoring network which collected data annually. The agency kept a “skeleton crew” of fixed stations active but refocused resources on more intensive monitoring of each basin at the start of each 5 year planning cycle. The monitoring, which was contracted to the US Geological Survey, would feed directly into the biennial water quality assessment and impaired waters list required by the CWA and also into the basin plans. Finally, the NPDES permit renewals were extended in some cases to get all permits in a basin synchronized to be issued together at the end of the 5 year planning cycle.

The schedule for developing each basin plan was designed to incorporate stakeholder involvement throughout the process. Thus, one or more stakeholder meetings were held in each basin to kick off the planning process and get input on concerns in the basin that could help inform the water quality monitoring and other data collection for the plan. According to one manager who was involved:

One of the big places we sought stakeholder input was in the very beginning of the process to talk about what was going on, what we were going to be doing, to discuss the information we had, then get any initial information that they had, so we could compile and review and put all the preliminary information together. Then all of the available information we used to create the data collection plan.

Once the monitoring data were collected and analyzed, the agency presented the assessment in a second stakeholder meeting and got input from participants on high priority issues.

The interagency basin planning team then developed “implementation strategies” for the priority issues and incorporated them into the draft basin plans. One manager summarized the process the basin planning team used to generate the implementation strategies for the plan:



The agriculture people were there, the forestry people were there, the water protection and the water resource people were there, and we discussed the priority issues. We had laws and regulations to implement, and the implementation strategies were based to a large extent on those laws and regulations. So, they would be implementing the same types of things that we do, and then with maybe a little more focus if there was a problem that we didn't know about before.

Thus, as is evident in reviewing the basin plan documents, the implementation strategies that ended up in the plans were largely a description of ongoing programs that the agencies were conducting to address water quality and quantity, rather than a new set of commitments to work together on specific problems (GAEPD, 2010a). The draft plans, with sections on basin concerns and priority issues, implementation strategies, and future issues, were presented for input in a third stakeholder meeting prior to the draft plans being released for formal public comment and hearing. Once public comments were reviewed and incorporated, each basin plan was formally adopted by the Board of Natural Resources.

Managing the basin planning process became more complex over time, as plans for the 14 river basins were all simultaneously in different stages of development and stakeholder involvement. In addition, the process was modified after 1998 to incorporate court-ordered requirements for the development of TMDLs and TMDL implementation plans, as is reviewed in Section 3 of this case. EPA continued to provide grant funding from 1997-2003 for the consultant to assist in compiling the information from the basin planning coordinators and the different agency programs into the basin plan documents. All basin plans for the first full cycle were completed and adopted by the board by 2003, with the exception of the Tennessee River basin plan:

- 1997 – Flint, Chattahoochee
- 1998 – Coosa, Oconee, Tallapoosa
- 2001 – Savannah, Ogeechee
- 2002 – Suwanee, Satilla, St. Mary's, Ochlockonee
- 2003 – Ocmulgee, Altamaha

In 2004, the state legislature passed legislation initiating a new statewide water planning process, which replaced the river basin planning program. Although no further basin plans were developed, the agency continued to use the rotating basin cycle for monitoring and assessment, TMDLs, and NPDES permits.

The managers interviewed who are now immersed in implementing the new state water plan offered several perspectives on the outcomes of the river basin planning program. When asked about what the basin plans accomplished, the common theme was that they were valuable compilations of information but not effective guides to drive implementation:

One of the ways I would answer that question is that those were good reports. They had a lot of information in them. No one uses them. They are not living documents. They are things that people put on a bookshelf and rarely take off the bookshelf. There was stakeholder participation in doing it - there weren't the action items, and it wasn't tied to permitting, in the same way that it is with what we're trying to do now. It's another thing that's a step along the way, because those river basin management plans consolidated information that hadn't been consolidated before, but it didn't go the next step, which is what we're trying to do now, and make it a living document that's action oriented.

The plans themselves were inventories, there were very few forward looking elements about: now that we've done an inventory of how water is used, and we know where the impaired waters are, what do we see as actions to improve our water management? There was none of that, so there was nothing to implement essentially.

Probably the most valuable thing was the discussion and the communication that took place leading up to it. Near the end those plans ended up being the basin encyclopedia, not so much a useful day to day planning document that people would use. There is a fine line towards producing a plan that a good number of folks will open up and use, and ones that will just hold a door open. I think it's safe to say that we ended up on the wrong side of that fine line, on that iteration, and it did not end up being a document for permitting...It probably could have been more utilized than it was, but it was still not conducive for a lot of day to day decision making or planning, and for the most part, very unrealized.

Despite these limitations, some benefits of the river basin planning process was that it generated significantly more water quality data and engaged a group of agencies and stakeholders in thinking about resources at the watershed scale:

I think it put a focus on the watershed idea. Historically we'd work with treatment plants or water suppliers, or work with one treatment plant that was a big problem. This brought everybody in the branch to look at things in a little bit different way. Thinking about watersheds and thinking about how things affected other things...that might have been about the biggest one, getting the watershed idea out there, rotating those monitoring stations so we had a lot more coverage and a lot more information. Setting up all this information so when TMDLs rolled along we had a lot of information that the TMDLs could pull from. People were thinking watershed already when the TMDLs started.

Basin planning helped lay the groundwork for the more robust state water planning process which followed and was accompanied by substantial high-level political engagement and resource investment (Section 4):

This process – we built on what we had and what we could put together – a few grants from EPA, the people at the branch, a few people outside the branch with these other sister agencies, but there weren't tremendous resources to put into it. Tremendous resources go into the state water plan, and so those tremendous resources will very much enhance the watershed approach.

### **5B.3 Programmatic & Integration Strategies**

In the years between the adoption of river basin planning in 1991 and the shift to a new state water planning process in 2004-2008 (Section 4), the agency has worked on watershed management strategies through its programs and through cross-program integration efforts. This section first reviews the interesting story of the agency's TMDL development and implementation programs, which were driven by a 1994 lawsuit filed by environmental groups and subsequent court orders in 1998 and 2000. The section also briefly discusses innovations of the agency's NPDES program to require watershed monitoring, assessment, and protection plans of many permitted entities. Then, the focus shifts to the cross-program integration efforts pursued by merging the Water Protection

and Water Resource Branches in 2004 and creating Assistant Branch Chief positions to provide basin-level oversight.

#### Watershed Program Strategies: TMDL and NPDES

Georgia was the setting for one of the early significant citizen lawsuits in the 1990s that resulted in a rigorous court ordered schedule for TMDL development (*Sierra Club, et al. v. Hankinson, et al.*). The Sierra Club and a number of other environmental groups filed suit against EPA in 1994, challenging “everything about the Georgia program from the identification of WQLS [impaired] waters, to water quality monitoring, to the prioritization of state waters for TMDLs, to the number, adequacy, and pace of development for the TMDLs themselves.” (Houck, 1999, p. 55) After a 1996 court ruling that required EPA to develop over 1100 TMDLs within 5 years and an appeal of the decision by EPA, the parties agreed to a consent decree in 1997. EPA would develop the first 116 TMDLs and a portion of those thereafter and Georgia would develop the rest of those required, in conjunction with the 5 year basin planning schedule from 2000-2004. In 2000, environmental groups were dissatisfied with the pace and quality of TMDL progress and moved to re-open the consent decree, calling on EPA to develop implementation plans for the first set of TMDLs it had developed (see review of legal decisions in *Sierra Club, et al. v. Meiburg, et al.*). As a result of the legal negotiations that followed, Georgia volunteered and committed to develop the required implementation plans within 18 months after TMDLs were completed as part of the rotating basin cycle.

The ambitious schedule for TMDL development constituted a tremendous new workload for the agency in the years that followed. The basin planning process was revised so that for a given group of basins on the same schedule, monitoring happened in year 1, data assessment in year 2, TMDL development in year 3, issuance of NPDES permits in year 4, and development of TMDL implementation plans in year 5. Following this schedule, over 1000 TMDLs were developed from 2000-2006 for all the state’s major river basins. Most of the TMDLs were developed for fecal coliform and dissolved

oxygen, as well as some for biota/sediments, metals and fish consumption guidelines for mercury (GAEPD, 2010b). To meet the fast pace required by the consent decree, the TMDLs were developed based on existing data the agency had from the rotating basin monitoring, and stakeholder involvement was limited to the official public comment period on the draft TMDL. After a couple of years of implementation, the agency streamlined their individual TMDL reports for each waterbody into basin reports which covered all impaired stream segments for a particular pollutant. To accomplish this work, the agency's modeling unit expanded from three to at one point ten staff who were contributing to the TMDL development process.

In addition to the rigorous schedule for developing TMDLs, Georgia was one of the few and first lawsuit states where some form of an implementation plan was required, not through the 1997 consent decree but through a later court ruling in 2000. Thus, the agency faced uncharted terrain in the task of designing a program to produce a large number of implementation plans in short order. The agreements with the court and EPA concerning the substance of implementation plans were largely guided by EPA's TMDL rule adopted in 2000. The controversial rule's implementation by EPA was immediately halted through congressional action and later withdrawn by EPA in 2003, but nonetheless it provided some direction for Georgia regarding the elements to be addressed in an implementation plan. Georgia and EPA signed a Memorandum of Agreement to develop a generic, or "boilerplate," implementation statement in each TMDL document, which would later be supplemented by a more detailed "revised TMDL implementation plan" by a specified date. Modeled after EPA's 2000 TMDL rule, implementation plans were to contain the following elements:

- Source categories, subcategories, or individual sources which must be controlled;
- A description of regulatory or voluntary actions, including management measures or other controls, by government or individuals, that provide reasonable assurance that reductions will be achieved to meet water quality standards;
- A schedule for implementing the management measures or other control actions as expeditiously as practicable and measurable milestones for determining whether management measures or other control actions are being implemented;

- A monitoring plan designed to measure the effectiveness of the management measure or other controls, the progress the water body is making toward attainment;
- A goal of attaining and maintaining the applicable water quality standards within 10 years, where that is practicable. (internal document)

After environmental groups succeeded in getting the court to require implementation plans in 2000, Georgia took responsibility for developing the first set of over a hundred implementation plans by April 2001. The agency formed an advisory group of stakeholder organizations, including forestry, agriculture and local government interests, to help design the new TMDL implementation program. With input from the advisory group and EPA, the agency decided to work with the state's Department of Community Affairs to contract the development of the plans to Georgia's 16 Regional Development Centers (RDCs). The RDCs regularly work with cities and counties on regional planning and were seen as a good fit for bringing together various stakeholders on TMDL implementation activities. After the initial set of required plans was finished, the agency continued to contract with the RDCs to develop implementation plans for the rest of the court-ordered TMDLs in conjunction with the basin planning cycle.

Considerable initial effort went into working out the details of the contracting arrangements and getting the RDCs up to speed with the technical aspects of developing the plans. Some of the RDCs had stronger expertise in water management issues while others had little or none, requiring significant training and ongoing guidance. RDCs received \$3500-\$5000 to produce each TMDL implementation plan for an impaired stream segment. The initial funding for the RDC contracts came from EPA grant funds which Georgia had accumulated, and later the contracts were funded through Performance Partnership Grants from EPA. In 2002, a separate TMDL implementation program unit was created with additional staffing – at one point as many as 12 positions – which were made possible through state funding. The agency's program staff focused on conducting education and outreach to stakeholder groups on TMDL implementation plan

requirements, working with other agencies on nonpoint source efforts, and providing technical guidance and oversight to RDCs concerning the substance of the plans.

Over time, in what one manager termed a “prolonged and arduous evolution,” the agency made changes to the guidelines and contracts in an effort to improve the effectiveness of the TMDL implementation plans that were produced. The program added new requirements for RDCs to increase the amount of stakeholder participation in plan development and outreach to promote plan implementation. RDCs were also asked to do additional surveying of pollutant sources in the watershed to supplement the data in the TMDL. Better technical guidance was provided to give RDCs a standard process for determining whether additional management practices, beyond what stakeholders were already implementing, should be incorporated into the plan. With all the iterative rounds of new guidelines for the TMDL implementation plans, the agency did receive feedback from frustrated RDCs who wanted more stability in the process.

Another significant evolution over time was the prioritization process for funding TMDL implementation plans. In the beginning under the 2000 court requirements, all TMDLs had equal priority. As the number of TMDLs expanded each year relative to a finite budget for the implementation program, the agency developed a 3-tiered system for developing some plans internally, contracting some to RDCs as before, and prioritizing a couple per basin with more significant funding, where there were stakeholders invested in implementing a more robust watershed plan. Now that Georgia has satisfied its court ordered TMDL schedule, the agency is making a greater shift in this direction. The strategy is to have a basic implementation plan written into all TMDL documents, but to focus implementation resources on targeted Watershed Improvement Plans. In this way, rather than putting a little bit of money into a lot of plans with limited actual implementation, the agency will make a larger investment to support more robust watershed assessment and restoration plans where stakeholders are committed to taking action. In this arrangement, each RDC will receive a contract to work with stakeholders on one significant Watershed Improvement Plan each year. This shift has been in

alignment with EPA Region 4's watershed approach strategy to focus on stakeholder-based restoration efforts in priority watersheds to yield measurable water quality improvements.

While on one level it was a significant accomplishment just to generate over a thousand TMDLs and implementation plans in 5-7 years, agency managers readily acknowledged a number of limitations regarding the TMDL program's impact. As has been the case nationally, TMDLs are often based on limited data, which constrains their utility as a policy tool. Most of the TMDLs developed were for pollutants from nonpoint sources, so there were a relatively small number of cases where TMDLs were linked to point source discharges that the agency could address through NPDES permits. Thus, the potential impact of the TMDL program was largely constrained by what would be accomplished through the voluntary TMDL implementation plans to address nonpoint sources. On this point, one of the agency's internal program documents concludes:

Despite outreach requirements following contracted plan preparation or revision, lack of direct funding for installation of management practices and activities and the non-regulatory, primarily voluntary nature of nonpoint source management, has resulted in a *lack of local acknowledgement and application of TMDL Implementation plans.* (emphasis added)

During the same time period but separate from the TMDL program, changes were also adopted in the NPDES program to incorporate some innovative watershed-based requirements linked to wastewater discharge permits. The requirements were initially established for new or expanding wastewater dischargers but later applied to all permit renewals for facilities above a certain discharge threshold (1 MGD). First, applicants were required to submit a Watershed Monitoring Plan designed to "document current water quality and identify stressors that affect the quality of water resources" in the facility's service area (GAEPD, 2005a). Once approved by the agency, the applicant was to implement the monitoring plan and submit a Watershed Assessment on the findings, which would "identify sources of current water quality problems and identify the potential effects growth and development will have on water quality in the future"



(GAEPD, 2005b). Based on the assessment, the city or county was required to submit a Watershed Protection Plan with strategies to improve and meet water quality standards, with annual reporting on implementation actions each year thereafter (GAEPD, 2005c). While applicants for new or expanded discharges had to do many of these requirements before receiving their permit, facilities with renewals had the 5 year permit cycle to complete the watershed monitoring, assessment and protection plan.

These watershed-based requirements started as an innovation within the agency but were later formally adopted into the agency's rules by the Board of Natural Resources. Interestingly, there was not much resistance from the regulated community:

When you really explain it and get into talking about quality of life, and you get into emphasizing how we're going to tie a permit to it, you can really make a case for the logic of it. And they just see the light...we've had very little push back on it.

In some cases the plans have made connections to TMDL implementation plans in the same watershed. A constraint on the effectiveness of the strategy is that there is limited staff time devoted to reviewing and acting on the plans submitted by permitted dischargers. Statutory program duties required by EPA tend to take precedence. Nevertheless, these plans developed and used by permit holders have increased the awareness of numerous factors in the watershed affecting water quality beyond the activities of point source dischargers.

#### Integration Strategies: Watershed Protection Branch & Assistant Branch Chiefs

In 2006, EPD made the decision to consolidate the Water Protection and Water Resources Branches into one Watershed Protection Branch. The two functions had been housed together originally, but had been split and operating separately for decades. To some degree, the change was a marriage of convenience, prompted by the Water Resources Branch Chief retirement and the opportunity to combine the two functions under the new Water Protection Branch Chief who had just come on board. More importantly, however, the EPD Director was looking ahead towards the new comprehensive state water planning process to address interlinked water quality and quantity problems and recognized the need for more integrated management. The change

happened fairly abruptly, without any real reorganization of program roles and responsibilities beyond putting the two sets of programs together under one Branch Chief.

After a year or so had passed, the EPD Director and Watershed Protection Branch Chief decided to create new Assistant Branch Chief positions to provide enhanced program oversight at the basin scale. They divided the state into 5 regions along basin boundaries, and each Assistant Branch Chief was hired to oversee a region with 2-4 basins. The Watershed Protection Branch Chief, who had worked outside the agency prior to assuming the role, recognized that the agency was very siloed along programmatic lines, with limited communication and coordination across programs. Different program staff would be working on different issues in the same watershed or local jurisdiction, or even with a single facility, with limited awareness of what the others were doing. Such compartmentalization is a common phenomenon in large organizations, but agency leaders recognized the need for someone to hold the bigger picture and facilitate more effective interactions across programs. The Assistant Branch Chief structure was a new experiment for the agency, with fairly open-ended roles and responsibilities that became more clearly defined with experience over time.

Coordination across internal programs, particularly the different permitting functions, has been a key role of the Assistant Branch Chiefs. Many of the emerging issues in state water planning at the time had to do with the water quality-quantity nexus and the need for more integrated assessment to inform permitting decisions. The agency needed to get a better handle on where interbasin transfers were occurring, for example when one facility had a water withdrawal permit to provide public drinking water but the resulting wastewater was treated and discharged in another basin. Even within the same basin, water withdrawals upstream could affect river flows and assimilative capacity for wastewater dischargers downstream. Historically, there had been limited coordination between the permitting staff for water withdrawals, drinking water facilities, and wastewater facilities. Each program made decisions based on their regulatory duties and

criteria, without the added knowledge and complexity of how it would affect other permitted activities in the basin and vice versa. In the new structure, the Assistant Branch Chiefs were at the top of the chain to review and sign off on all permit decisions in their basins, which gave them greater opportunity to catch and address issues that needed more cross-program attention. To aid these connections, wastewater permit staff had a new requirement to note on the permit approval sheet where the associated water withdrawal permit was occurring, and vice versa for water withdrawal permit staff.

The other key facet of the role has been to provide a more accessible and proactive “face” to the regulated community and other stakeholders. Because there are always more issues to address than managers to address them, the agency is often caught in a reactive mode, interacting with stakeholders mostly where there were problems and enforcement actions. It was envisioned that Assistant Branch Chiefs could anticipate issues and work with the regulated community on more proactive solutions. They could bring different entities together where there was potential for regional coordination that would provide mutual benefit. In addition, the new role gave stakeholders a clear go-to person for support in resolving issues. From the managers interviewed, this enhanced external coordination has been one of the greatest benefits of the Assistant Branch Chief positions, and stakeholders have by and large been appreciative of the change. At the same time, one manager noted the challenge of trying to keep these proactive stakeholder interactions going when there are so many new issues that come up each day demanding immediate attention:

Even with all the best intentions, probably 50% of my time is taken up with the new 5 emails each morning with the daily fires that need to be fought. I can drive to work and think of all the great things that I would like to do today, and write down all these good ideas, and I get to work and here we go with the daily firefights in the basin. Here are the five things you didn't know about before you came in today, and they all have to be solved by the end of the day, and have an answer, and all the things you were going to do today get thrown under the bus.

The internal implementation of the new leadership structure has been a more mixed experience. The managers interviewed see the change as very beneficial for

improving agency coordination and decision making. One manager noted how the Assistant Branch Chiefs can play a critical role in championing important actions that none of the program managers have time to coordinate, for example, the recent completion of a revised dissolved oxygen standard for the Savannah Harbor which had needed to happen for 18 years. The flipside of this more focused attention is that it tends to expand the workload demands on program staff, who before only had to answer to their direct program supervisor. Some staff members have expressed frustration about now having 5 new bosses and getting overloaded with the conflicting priorities for action they receive from different managers. The agency is still in the learning curve for how to balance the programmatic lines of accountability with the integrating, basin-focused force of the Assistant Branch Chief positions.

## **5B.4 State Water Planning**

### State Water Planning: Process

In 2001, a number of pressing water resource challenges in the state provided sufficient policy momentum to move the state legislature in the direction of a comprehensive state water plan (Georgia Water Council, 2005). A severe drought in 1999-2000 exacerbated water quality and quantity problems across the state. EPD had issued a temporary moratorium on additional water withdrawals in the Floridan aquifer due to saltwater intrusion problems and in the Flint River basin where groundwater withdrawals were depleting river flows. Water allocations disputes with Alabama and Florida over shared river systems had not been resolved. In response to these and other policy challenges, the state legislature created a Joint Comprehensive Water Plan Study Committee and a 50-member Water Plan Advisory Committee to study the state's issues, examine existing policies, and develop recommendations for a state water planning process. The Committee submitted its report to the Governor and General Assembly in 2002 (Gillis & Hanner, 2002). A state water planning bill was developed in 2003 but failed to pass in the final minutes of the legislative session due to some controversial elements. As one policy advisor summarized:

It died because a bunch of things got piled onto it where people were trying to take legislation that was, at its heart, to authorize a state water plan, and use it to resolve their issues and protect their interests by putting specific pieces in there, one of which was a provision that would allow trading of water withdrawal permits.

The Governor worked with the state legislature on developing a “clean” bill, without specific divisive elements, which helped the *Comprehensive State-wide Water Management Planning Act* to be successfully passed in 2004 (O.C.G.A. 12-5-520 [HB 237]). The Act charged EPD to lead the development of a state water plan by 2008 and replaced the previous River Basin Management Planning legislation from 1991. The new state water plan was to be consistent with the policy statement developed by the Joint Committee:

Georgia manages water resources in a sustainable manner to support the state’s economy, to protect public health and natural systems, and to enhance the quality of life for all citizens.

The Act laid out nine guiding principles for water planning that had been developed by the Joint Committee, which included the recognition that “water quality and quantity and surface and ground water are interrelated and require integrated planning as well as reasonable and efficient use.” A major thrust of state water planning was to provide a structured yet flexible process for regional water planning. The Act called for extensive stakeholder involvement and specified the membership an interagency coordination committee, the Water Council, to oversee and work with EPD in the planning process. The Water Council was to submit the proposed state water plan to the legislature at the beginning of the 2008 session.

With the Act’s brief guidance as a charge, EPD’s Director led a policy team in designing a process to develop the state water plan with robust technical and stakeholder input. Four overarching policy objectives, distilled from the 41 issues raised by the Joint Water Plan Study Committee, became the focus of in-depth policy research reports by the University of Georgia:

1. Minimizing withdrawals of water by increasing conservation, efficiency and reuse;
2. Maximizing returns to the basin through reducing interbasin transfers and limiting use of septic tanks and land application of treated wastewater where water quantity is limited;
3. Meeting instream and offstream water demands through storage, aquifer management and reducing water demands; and
4. Protecting water quality by reducing wastewater discharges and runoff from land to below the assimilative capacity of the streams.

In addition, 4 technical advisory committees were convened with relevant experts to develop guidance for water conservation, water reuse, instream flows, and on-site sewage management systems.

EPD used the findings from the policy reports and technical advisory committee deliberations to generate discussion packets and policy options to be vetted through a structured stakeholder involvement process (Cowie, Askew & Tobin, 2009). To gather regional perspectives, six *basin advisory committees* were assembled, in addition to the existing planning district in metro north Georgia, to cover each geographic region of the state based on river basin groupings. The basin advisory committee members were selected to represent upstream and downstream interests from diverse sectors including conservation, agriculture, business, industry, recreation, and local government. During 2005-2007, six meetings were held with each basin advisory committee, with each meeting focused on getting diverse input on a specific topic and set of policy options for the state water plan. EPD also convened eight meetings of a *statewide advisory committee*, composed of representatives of diverse stakeholder organizations with statewide constituencies, to provide additional input after each round of basin meetings on a policy topic. EPD hired neutral, professional facilitators to convene all the committee meetings who clearly framed the purpose as gathering a diverse range of perspectives, *not* trying to generate consensus.

The technical and stakeholder input assisted EPD in forging a draft state water plan that went to the Georgia Water Council for review and revision in June 2007. Prior to that point, the Georgia Water Council had been consulted by EPD in the planning

process and had facilitated three rounds of “town hall” meetings to get public input on the early water quantity and quality policy options. With EPD’s draft plan complete, the Council took the lead role in conducting the final phase of public review and revision, as specified in the 2004 legislation. Three rounds of public review and comment were held on successive drafts of the state water plan in June, September and December 2007. In all over 1000 comments were received, to which the Council provided lengthy response documents online (Georgia Water Council, 2007). The final proposed state water plan was submitted to the General Assembly at the start of the 2008 legislative session and was quickly adopted with over 75% of the vote in both houses. The plan was signed by the Governor in February 2008.

#### State Water Planning: Outcome

In 40 concise pages, the state water plan provides a cohesive policy statement regarding the need for long-term, proactive planning that addresses the connections between water quality and quantity and multiple resource demands and constraints (Georgia Water Council, 2008). The plan’s sections set forth a number of general policies and considerations regarding a range of practices that may be used to manage water demand, return, supply, and quality. Early on in the planning process, the decision was made to leave all water management options on the table as possibilities and develop an adoptable plan that would be supported on the whole by stakeholders. Thus, the plan intentionally avoided making significant new policy decisions on a number of contentious issues such as interbasin transfers, new reservoirs for surface water supply, and water conservation requirements, leaving these to be decided in future rulemaking and agency guidance. Much of the force of the plan is in its new framework for conducting comprehensive resource assessments and forecasts which will guide regional councils in developing long-term water conservation and development plans.

One of the main issues that came up in the state planning process was the need for better information on the quantity and quality of surface and groundwater throughout the state to aid decision making. As the plan states, “we cannot effectively plan for and

manage what we do not measure” (Georgia Water Council, 2008, p. 5). Although in-depth studies had been done over the years for particular regions and issues, the new approach would apply a consistent assessment methodology to all regions of the state at the same time. The first stage of the plan’s implementation would involve a significant investment in monitoring and modeling to do statewide resource assessments of surface water availability, groundwater availability, and surface water quality/assimilative capacity. An 11-member Scientific and Engineering Advisory panel was formed to review the methodology for the assessments carried out by EPD and other agencies “to ensure that the scientific basis of the resource assessments is sound and will yield credible results” (GAEPD, 2010c). At the same time, forecasts of water and wastewater demands out to 2050 would be prepared for four water use sectors: agricultural, domestic and commercial, energy, and industrial.

The resource assessments and forecasts form a more robust information base for the new regional water planning process that is the core of the state water plan. The plan divides the state into 11 water planning regions, one of which is the 15-county Metro North Georgia Water Planning District surrounding Atlanta that was established by state law in 2001. One point of contention during the state planning process concerned whether to define the planning regions by water resource boundaries or by political decision making boundaries (counties). The challenge of using watershed boundaries is demonstrated by the metro Atlanta planning district which itself includes portions of 5 river basins. In the end, the plan took a middle ground approach using county-defined regions which generally align with common water resource areas. The resource assessments would be based on river basin or aquifer boundaries, which would in principle require regional planning councils to work together to resolve issues regarding shared water resources. This decision to use political boundaries was very much opposed by environmental groups, foremost the Georgia Water Coalition, which represents a number of environmental organizations and has been very active in state water policy issues (Georgia Water Coalition, 2007).



For each of the designated planning areas, a 30-member regional water planning council would be appointed to be broadly representative, including “agriculture, forestry, industry, commerce, local governments, water utilities, regional development centers, tourism, recreation and the environment”(Georgia Water Council, 2008, p. 36). To identify council members, EPD would solicit names and qualifications of potential candidates from organizations representing these varied interests. From these, the EPD and the state Departments of Agriculture, Community Affairs and Economic Development would provide a list of individuals to be considered by the Governor, Lieutenant Governor, and Speaker of the House, who were authorized to appoint council members. The plan stipulated a minimum number of local elected officials from city and county jurisdictions that had to be included in the appointments, which amounted to roughly one-third of each council’s membership. Council members who were appointed would serve a term of 3 years with possibility for reappointment.

Each regional council was charged with the chief task of forging a *regional water development and conservation plan*. The councils were to integrate information from the resource assessments and regional forecasts to chart a long-term plan (10 to 40-year planning horizons) for how water and wastewater needs would be met within the limits of resource capacities. EPD was to develop regional guidance for the content of the plans and provide direct and contracted assistance to the councils on technical elements. The councils would be empowered with considerable flexibility to determine the strategies to meet needs, selecting from an array of management practices covering water demand, supply, return, and quality. However, since surface and groundwater resources are shared across planning regions, the councils were required to “communicate and coordinate with adjacent, upstream and/or downstream councils as well as EPD to ensure the appropriateness of the recommended management practices.” Once regional plans were reviewed, revised as recommended, and adopted by EPD, they were to serve as a guide for permitting and infrastructure funding. Resource assessments would be updated

periodically (e.g. every five years), at which point the regional plans would also need to be revisited and revised as needed.

### Early Implementation

While the state water planning process was run by the EPD Director's policy team, primary responsibility for the plan's implementation shifted to the Watershed Protection Branch. A full-time project manager for the state water plan was hired to work with the branch chief and senior management team on defining, prioritizing, and coordinating actions to implement the plan. The project manager coordinates weekly meetings with a planning team that consists of the branch chief, assistant branch chiefs, a technical manager who directs the resource assessments, EPD policy advisors, and other key staff. Interagency coordination on the plan's implementation is facilitated through monthly meetings among agency managers and quarterly meetings of agency heads which provide high-level oversight. Assistant Branch Chiefs support the work of the regional councils in their basins and have been assigned one support staff each to assist as liaisons with the councils. Thus far, the state water plan's implementation has been focused in the senior planning team and has not had much impact on the everyday work of programs in the branch. It is anticipated that this will change in the future as the regional plans are produced and must be integrated with the agency's permitting, funding, and other relevant programs.

The early stages of implementation have focused on setting up the regional councils and coordinating the internal and contracted work on resource assessments and forecasts. In early 2009, the Governor, Lieutenant Governor, and Speaker of the House appointed 30 council members to each of the 10 new regional councils. The state water planning team convened four meetings in 2009 to get each council established with its governance structure, including the required Memorandum of Agreement. The meetings also focused on training council members in the main elements of regional water planning that laid ahead. The main tension in working with councils thus far has been that members are very action-oriented and want to get started working with the forecast and

resource capacity numbers, which have not yet been available. Regional councils and stakeholders have given input on some of the forecasts that were being developed in 2009. At the time of research interviews in late 2009, the agency was working towards completing and presenting the draft resource assessments to clusters of councils that share a common basin or resource area in January 2010. In 2009, EPD released a guidance document for regional planning in July 2009 which called for regional councils to submit their draft plan to EPD by January 2011 to be reviewed, revised, and adopted by June 2011 (GAEPD, 2009).

There have been concerns among many stakeholder groups about lack of sufficient representation of their interests on the appointed regional councils. For example, only around 5 of the 300 council members specifically represent environmental and conservation organizations. Some agriculture interests have expressed they are not sufficiently represented, while other stakeholder groups feel agriculture already has too much influence. In the state water planning process, local governments had sought to get at least 50% of the positions, but the compromise in the plan was to have 1/3 of the members as local government supplemented by an advisory committee of local government officials to allow greater input into regional council decisions. The agency has been trying to develop an effective structure for stakeholder advisory committees and other issue-based forums to provide more stakeholders access to the planning process.

It will be very interesting to see how the steps ahead in state and regional water planning will affect the agency's watershed management decisions and outcomes. Much is yet to be figured out concerning the linkage between the management practices set forth in the regional plans and how these will be used to guide agency permitting decisions. The state water plan clearly stipulates that regional plans will guide agency permitting and infrastructure funding, and this is reinforced statutorily in the 2004 water planning legislation and in sections of the state Water Quality Control Act that authorize regional water development and conservation plans (O.C.G.A. 12-5-520, Georgia Water Council, 2008). However, EPD retains statutory authority and must make decisions that

comply with existing rules and regulations. There may need to be additional rule-making to accomplish some of the state water plan's recommendations and to take up some of the controversial issues the plan did not directly address. Most of the focus now is on wastewater and water withdrawal permitting, and new strategies have not yet been developed to address pervasive unregulated nonpoint source pollution problems.

### **5B.5 Reform Outcomes**

This section summarizes and discusses some of the accomplishments and challenges of the agency's watershed approach strategies, in relation to the four reform dimensions of this study. Additional discussion of key issues as they relate to the EPA context, other state cases, and the reform literature is provided in Chapter 6.

#### Integrated Management

The river basin planning process adopted in the early 1990s was Georgia's first effort to do comprehensive water planning for all basins in the state. The basin plans pulled together information from several agencies on water quality, water quantity, groundwater, land use and permitted activities, and various agency programs for point and nonpoint source management. While useful as inventories, the plans were generally not well linked to agency permitting decisions and other implementation actions to address problems. Georgia's rotating basin model connected monitoring and assessment, TMDL development, NPDES permitting, and TMDL implementation plans in a 5 year cycle which continued to be used after river basin planning ended.

The state water planning process has aimed to build on the foundation of prior efforts in the direction of integrated management at a regional scale. The focus is on conducting more comprehensive assessments of resource capacity for the states river basins and aquifers in terms of water quantity (sustainable yield) and water quality (assimilative capacity). The assessments will drive regional water development and conservation plans which will in turn guide agency permitting decisions. Near the end of the state water planning process, the decision was made to define regional planning areas by political jurisdictions that generally align with common river basin or aquifer areas.

This decision was particularly controversial for some environmental organizations in the state that wanted planning on watershed boundaries. It remains to be seen how this structure will manage tensions among the many political jurisdictions vying for their share of the water and the ecological limits of the shared cross-boundary water resources.

#### Collaborative Management

The adoption of river basin planning in the early 1990s initiated a new structure for stakeholder involvement in the agency's decision making beyond the typical required public comment and hearing processes. There was a recognition in Georgia, as well as in the EPA's emerging watershed approach guidance, that nonpoint source pollution was the key remaining water quality problem and that collaborative and non-regulatory solutions would need to be fostered. The legislation that mandated river basin management planning gave minimal substantive direction but was clear in requiring that local advisory committees of diverse stakeholders be established first for each basin to give input in the agency's planning processes. EPD and other key agency partners designed the basin planning framework to have open public meetings at multiple stages in the development of the basin plan, in addition to the required formal public hearings at the end on the draft plan. Nonetheless, the type of involvement was more on the passive end of the spectrum, presenting what the agency was proposing to do and getting input from participants that might be incorporated into the plan in some way. It did not go to the level of stakeholders working together on an ongoing basis to devise and implement action strategies to address particular problems.

The 2004 legislation that mandated state water planning called for extensive stakeholder involvement. EPD's leaders and the interagency Water Council took this to heart by facilitating multiple stakeholder meetings with the statewide and basin advisory committees regarding the plan's policy components and incorporating general public input through public meetings and comment periods on multiple drafts of the plan. Through this process, a structure was developed of politically appointed regional water planning councils who are charged with forging an integrated plan of water management

practices to meet forecasted demands within the constraints of the assessed resource capacities. The intent of these changes is to empower regional leaders with sufficient authority, technical resources, and flexibility to develop sustainable solution pathways. Much remains to be seen what internal changes in agency decision processes will be required to incorporate the long-term water plans developed by regional leaders. The Assistant Branch Chief positions with basin oversight roles, created in 2005, will no doubt play a key role in navigating this new terrain and bridging agency and stakeholder decision making.

### Adaptive Management

Adaptive management has not been a prominent term used in river basin planning or state water planning, but the principles are to some degree embedded in the strategies used by EPD. River basin planning set up a 5-year rotating basin cycle of monitoring and assessment, synthesizing basin information and stakeholder input into a management plan, and implementing the plan through permits and programs. The concept was that with each new five year cycle, monitoring and assessment would provide an updated picture on conditions and problems which would inform subsequent management plans and actions. The last chapter of each basin plan discussed the “need for continuing and adaptive management,” emphasizing the basin plan was a first step and stating:

Management is ongoing and dynamic because changes in resource use and condition occur continually, as do changes in management resources and perspectives. Therefore, management planning and implementation must remain flexible and adapt to changing needs and capabilities (GAEPD, 1997, Chapter 8, p. 8-1 of Flint basin plan)

However, this ideal was limited in practice by several factors: the plans did not specify and track management strategies to address problems, they were not well linked to permits, the TMDL implementation plans for nonpoint sources were voluntary and generally not implemented by local entities, and the iterative planning cycle ended after one round, being replaced by a new state water planning process.

Nonetheless, the state water plan does draw on prior data and modeling that were done through the rotating basin framework to generate more comprehensive resource assessments for the river basins and aquifers in the state. The water quality resource assessment, for example, links the wasteload allocation modeling that was done for individual stream segments to produce a bigger picture model for the basin to guide regional decision making. Furthermore, the resource assessments incorporate new monitoring and modeling tools to get at additional problems, such as nutrient loading. The state is investing significant resources in long-term resource assessments and forecasts of demands so that ultimately the systems can be managed in an integrated, sustainable manner through permitting and other policy tools. Agency managers see this as building the capacity for adaptive management, though they are still in the early stages and do not know yet how the regional plans will take shape. The state water plan and regional water plans are to be revised every 5 years based on new data from the agency's ongoing water monitoring and assessment efforts. There is a provision that benchmarks providing metrics for review and adjustment of plans will be incorporated into the regional water plans.

#### Results-Oriented Management

As has been discussed, the river basin plans developed by the agency in the 1990s did not have a strong tie to implementation of strategies to improve water quality. The TMDL litigation initiated by environmental groups can be seen as a strong call for more action by EPA and EPD to address water pollution problems. The legal actions resulted in the agency investing significant new resources to mass produce over a thousand TMDLs and implementation plans in seven years. Most of the TMDLs called for nonpoint source pollutant reductions which the agency did not have regulatory authority to address. The TMDL implementation program made some inroads in engaging Regional Development Centers and local jurisdictions in identifying nonpoint source pollutants and management practices. Ultimately, though, the implementation plans were voluntary and resulted in limited implementation for nonpoint source load reductions,

much to the chagrin of the environmental groups who had waged the lawsuits. As the program unfolded, managers recognized that implementation was only going to occur where there were stakeholders committed and funding devoted to it.

EPA's recent focus on achieving measurable results to restore impaired streams in small watersheds are being addressed through nonpoint source (319) grants concurrent with the long-term, large-scale, and high-level policy process of state water planning. Ultimately, the regional water plans will have to set some benchmarks for assessing whether water quality and quantity goals are being met, but that evaluation will take some years to be developed. The near term policy focus is on water quality and quantity permitting and infrastructure decisions, where there is a regulatory nexus. On a programmatic level, however, the TMDL implementation and nonpoint source programs are increasingly focusing their limited resources on more robust small-scale watershed improvement plans that have greater potential for yielding measurable water quality improvements.



## **Case Study C: Kentucky's Watershed Approach Reforms**

### **5C.1 Introduction & Context**

This case study focuses on the watershed management framework that was adopted by Kentucky's Division of Water and a host of other agencies in 1997. The Division led the development of the watershed framework, which was influenced by EPA's watershed approach guidance for states and facilitated by the same consultant who worked with North Carolina and Georgia on basin planning frameworks. Kentucky's approach was unique in the breadth of interagency and stakeholder coordination it embraced, through the establishment of ongoing coordination forums at the statewide and basin level. Kentucky's basin planning model also took new steps by emphasizing the selection of priority watersheds to target local watershed planning and implementation efforts. The case study describes the design, implementation, and evolution of Kentucky's watershed management framework from 1996 to the time of research interviews in fall of 2009. This introductory section introduces some key environmental and institutional factors relevant to watershed management in Kentucky, most of which are beyond the scope of the case but help to situate the reader in the larger policy setting of the agency's watershed approach efforts.

Kentucky's major river basins all drain to the Ohio River, which forms the state's northern border with Ohio, Indiana, and Illinois. In the eastern mountainous region of the state, the Big Sandy river basin flows north to the Ohio, draining portions of Virginia, West Virginia, and Kentucky. The Licking, Kentucky, and Green River basins originate in the state's southeastern mountains and flow north and west to join the Ohio River at different points. The Salt River, originating in the middle of the state between the Kentucky and Green basins, also flows north to the Ohio River. The Upper Cumberland River begins in southeast Kentucky, flowing south and west through a significant portion of north-central Tennessee that includes the city of Nashville. The Cumberland reemerges in the "Four Rivers" region of southwest Kentucky, where its lower reaches, along with

the lower Tennessee River and two other tributaries, merge with the Ohio River, not far from its confluence with the Mississippi River.

One major source of water quality problems in the state is inadequate wastewater treatment infrastructure. In the state's more populated areas, two large regional wastewater districts – Sanitation District 1 in northern Kentucky and the Louisville-Jefferson County Metropolitan Sewer District – are under major consent judgments with EPA to control combined sewer overflows. This enforcement action has been a driver for the districts to pursue some innovative watershed approach strategies in order to achieve pollutant reductions more cost effectively. Many rural areas in the state are not served by centralized wastewater treatment facilities, leading to bacterial pollution from faulty onsite wastewater systems and “straight pipes,” which direct raw household sewage directly to creeks. The Kentucky PRIDE initiative (Personal Responsibility in a Desirable Environment) was launched in 1997 with federal congressional funding to address straight pipes, leaky septic systems, and illegal dumping in 38 rural counties of southern and eastern Kentucky (Kentucky PRIDE, 2010). The voluntary program has been successful in connecting over 28,000 households to sewer or septic systems through voluntary grants, but there are still many straight pipe and failing onsite wastewater systems remaining in the state.

Pollution from natural resource industries, such as agriculture, mining, and forestry, are other significant sources of water quality problems. Agricultural production is important in many parts of the state, including livestock and row crop production and Kentucky's famous horse farms. In 1994, the state legislature passed the Agriculture Water Quality Control Act, which requires all landowners with 10 or more acres in agriculture or forestry operations to develop and implement a water quality plan (KRS 224.71-100 to -140). The plans must comply with state best management practice guidelines and are submitted to the Division of Conservation, which administers the policy and provides technical assistance and cost-share funding. Mining and forestry activities have been historically prominent, contributing to legacy problems such as acid

mine drainage, and continue currently in some parts of the state. Coal mining through mountaintop removal is a significant water quality concern in the eastern region of the state. In 2000, a disastrous spill from a coal mining impoundment, which was regarded as one of the worst in the southeastern region's history, released 300 million gallons of coal sludge into mountain streams in the Big Sandy basin (Sludge Safety Project, 2005).

Kentucky is particularly vulnerable to wastewater and nonpoint source contamination due to the unique karst topography that underlies half of the state. The water soluble limestone geology results in many sinkholes, springs, caves, and subterranean drainage systems that readily interlink surface and groundwater systems. Drinking water is derived from surface and groundwater sources, which in karst areas are much more susceptible to contamination by pathogens from untreated human wastewater and livestock waste, as well as pesticides, fertilizers, and other nonpoint source pollutants. In spite of these challenges, the rivers and cave systems of Kentucky are highly regarded for their biodiversity and have been targeted for protection efforts by groups like The Nature Conservancy.

Kentucky's Division of Water (DOW) is the lead agency for water management in the state, administering federal and state programs related to water quality, water quantity, and groundwater. DOW implements all Clean Water Act and Safe Drinking Water Act programs. In addition, DOW manages groundwater monitoring and protection programs and water quantity programs for water withdrawal permitting, water supply planning, and drought management. The agency's branches have been reorganized several times in the last decade in an attempt to streamline and integrate programmatic functions in the face of growing resource limitations. From 2002-2008, DOW lost around 30% of its senior managers and staff to retirement. DOW is contained within the state's Department of Environmental Protection, which also houses divisions for air quality, waste management, enforcement (all media), and environmental services (laboratory support). The Department's 10 regional offices house compliance inspection staff for DOW and the other divisions.

The only significant policy action at the state level concerning watershed management has been the interagency adoption of the Kentucky Watershed Management Framework in 1997, which was led by DOW. The development and implementation of this framework by the agency is the subject of this case study. Section 2 summarizes the process of designing the framework in 1996-1997, which was supported by EPA's funding for consultant facilitation services. Section 3 describes the framework and its early implementation. Section 4 discusses some key organizational changes at DOW that have affected its watershed approach strategies, as well as some of the challenges and lessons learned surrounding the framework's implementation over time. The concluding section summarizes some of the case findings in terms of the four reform dimensions of this study, which are further analyzed and discussed in Chapter 6.

### **5C.2 Design & Adoption of Watershed Framework**

In Kentucky, the initiative to adopt a watershed management framework came from within DOW, in response to the national focus and guidance documents of EPA. The Assistant Director of the Division at the time saw value in the guidance's systematic approach to organizing programs on a 5 year rotating basin schedule for greater efficiency and effectiveness. He decided to take advantage of available EPA grant funding to hire the facilitation consultant who had worked with North Carolina, Georgia and other states. The agency dedicated a state watershed coordinator position to champion the process in Kentucky, who worked closely with the consultant to implement an 18-month planning process among agencies to design Kentucky's watershed approach. The process started in March of 1996 and concluded with the release of an ambitious watershed management framework document in June of 1997 (KYDOW, 1997).

The framework was designed through the involvement of around 30 different agencies that participated in the Kentucky Watershed Framework Development Workgroup. Within the workgroup, sub-committees were formed to develop different aspects of the framework, including watershed monitoring and assessment, data management and geographic information systems, public participation, funding and

resource needs, and prioritizing planning and implementation of watershed management activities. Collectively, the workgroup decided on a rotating basin management process whereby the 12 major basins (6-digit HUC) were combined into 5 basin management units: Kentucky River; Salt and Licking Rivers; Upper and Lower Cumberland, Mississippi, and Tennessee Rivers; Green and Tradewater Rivers; and Big Sandy, Little Sandy, and Tygarts Rivers. An iterative 5-year cycle was set forth with phases which included 1) scoping and data gathering, 2) assessment, 3) prioritization and targeting, 4) action plan development, and 5) implementation. The cycle would begin with the Kentucky River Basin in July of 1997, with one new basin management unit initiated into the cycle each year thereafter.

The organizational structure that would be used to accomplish watershed management activities consisted of coordination forums established at the statewide, basin, and watershed level. A *Statewide Steering Committee*, established in January 1997 to help complete and formalize the framework, would provide ongoing coordination among over 30 agencies at the state level to oversee and support implementation of the watershed framework. *Basin teams* would be recruited to provide coordination at the basin scale, with voluntary members who were “skilled experts in technical fields and public relations.” (KYDOW, 1997, p. 2-18) Finally, *local watershed task forces* would be mobilized in the priority watersheds that were identified by basin teams, to “provide a forum for local government officials, industry representatives, farming, environmental, and other stakeholder groups to participate in Action Plan development and implementation” (KYDOW, 1997, p. 2-18). The critical bridge between these forums would be *basin coordinators* who would convene the basin teams, facilitate the work of local watershed task forces, and report to the Statewide Steering Committee on activities and needs. The framework document spells out the roles and tasks of each of these elements quite thoroughly, though it was largely a conceptual plan since the basin coordinators, teams, and task forces had not yet been established.

In early 1997, the workgroup convened a funding subcommittee to identify resource needs and opportunities for implementing the watershed framework. The subcommittee included representatives from the Governor's office, legislators, state program staff in budgeting and grants administration, among others. While many of the framework elements were to be achieved through better coordination of existing agency staff and programs, new resources would be needed to fund basin coordinator positions. In addition, the framework document emphasized that a *public information coordinator* position should be created, to lead the public education, outreach, and communication aspects of the framework's implementation. The funding subcommittee concluded that new funds would not be available for the coordinator positions in the next budgeting cycle, but that no legislative action would be needed for partner agencies to reallocate existing funding to support the positions. The framework document recommended that partner agencies in the Statewide Steering Committee should draft a joint statement to the legislature to bolster opportunities for funding the framework's implementation in future budget cycles.

The public release of the watershed management framework document kicked off the beginning of the first basin management cycle in the Kentucky River basin in July 1997. The Kentucky River basin is the most densely populated basin in the state and has generally been the guinea pig for developing and testing new water management strategies. Since 1988, the Kentucky River Authority has been the primary water resource agency for the basin, charged with managing the system of reservoirs and surrounding watershed for water supply and quality. The Kentucky River Authority took responsibility for contracting a basin coordinator position to the Kentucky Water Resources Research Institute at University of Kentucky, which was a key partner in developing the watershed framework. Much of the framework's strategies, such as the prioritization formula and various report formats which are described in the next section, were developed for the Kentucky River basin with these key partners. This work

provided a general template for the other basins which entered the basin cycle in subsequent years.

One manager noted that the agencies involved in the framework's development were generally quite interested to work together and coordinate efforts through the watershed management framework:

I think as a whole using the words “environment”, “sustainable” – those words were worn out already, and watershed was new and fresh. Everybody saw it as a non-threatening word, and every so many years we come up with a new buzz word, and people get on board, and at that time the word “watershed” was friendly.

This interest was perhaps strongest among the agencies that worked together on the coordinated monitoring efforts, as mentioned by another manager:

You know, we really got great cooperation. When you bring all those people together in one room – just getting folks to talk to one another on a personal level, it makes such a difference. We all were trying to do the same thing, all trying to get good monitoring data, and nobody really has enough resources to do it, so it was to everybody's benefit to cooperate.

### **5C.3 Implementation of Watershed Framework**

#### Coordination Forums

The Statewide Steering Committee was the first framework coordination mechanism to be established, in 1997. The watershed framework website currently lists 89 steering committee members, including representatives from state and federal agencies, stakeholder associations, universities, and DOW program managers (KYDOW, 2010a). On average, 25-35 of these members would show up for the steering committee meetings which were typically held twice a year. The meetings were run by DOW's state watershed coordinator, who was the main process champion keeping all the framework implementation elements on track. In the meetings, the committee received updates and gave input regarding the initial selection of basin teams and coordinators and the development of the basin cycle phases. These phases included monitoring, prioritization, and planning strategies. As the basin cycle progressed in different areas of the state, basin coordinators gave progress reports to the committee on the basin teams and watershed

initiatives in each basin. In addition, the steering committee meetings provided a venue where different members would give updates or presentations on watershed-related program and policy issues. One element of the framework document that never materialized through the steering committee's efforts was a funded public information coordinator position to assist with communication and coordination related to public outreach.

Starting in 1998, as each new basin management unit joined the cycle, a basin team had to be established. DOW's state watershed coordinator recruited basin team members from key agency and stakeholder groups, with input from the Statewide Steering Committee. Each basin team consisted of 10-20 members from various state and federal conservation agencies, universities, nonprofits, and other key public or private entities (KYDOW, 2010b). Members were primarily selected to bring together technical expertise that would be useful in developing and implementing management plans for the basin and priority watersheds. The basin teams generally met on a quarterly basis and were convened by the basin coordinator. Following the plan set forth in the watershed framework document, the first task of the basin teams was to generate a Basin Status Report, providing a brief overview of existing information about water quality in the basin and relevant issues such as land use activities, biodiversity, groundwater, and wastewater management (e.g. KYDOW, 2001). The reports were useful in getting the basin teams working together on a collective task, providing an initial public outreach document, and laying the groundwork for a strategic monitoring plan for the basin.

In addition to setting up the basin teams, the agency had to secure a basin coordinator position as each new basin management unit came into the cycle. The basin coordinators were to be stationed in the basin in order to coordinate efforts with the basin team and watershed stakeholders. In the original framework design, it was envisioned that different agencies would contribute towards funding the basin coordinator positions. For the Kentucky River basin, the position was funded through the Kentucky River Authority and DOW and contracted to the Kentucky Water Resources Research Institute



at University of Kentucky. In the other basins, DOW's state watershed coordinator had to scramble to secure resources each year to fund new basin coordinator positions in the Division or through contracts with partner agencies. As the basin cycle unfolded over time, full-time coordinators were hired at DOW for the Licking River, Upper Cumberland-Four Rivers, Green-Tradewater and Big Sandy-Little Sandy-Tygarts basin management units. In addition, the Four Rivers area in western Kentucky was supported by a part-time contract basin coordinator in the Jackson Purchase Resource Conservation & Development office. For the Salt River basin, a contract basin coordinator position was established, first with U.S. Geological Survey and later with University of Kentucky Cooperative Extension.

### Monitoring

The first two years of each basin cycle focused on water quality monitoring activities, which were conducted by DOW's monitoring program and partner agencies. Improving water monitoring through interagency coordination was a key element of Kentucky's framework. This work began with the Monitoring Subcommittee in the initial framework development and continued into the first cycle. Although DOW was the central water quality monitoring agency in terms of regulatory requirements, a number of other natural resource agencies were engaged in some type of monitoring. Collectively, the group saw the benefit in coordinating sampling locations and protocols to minimize duplication and enhance statewide coverage. Ultimately, DOW was able to use much more information to assess the state's waters through the coordinated monitoring of Kentucky Department of Fish and Wildlife (biological/fish data), U.S. Corps of Engineers (lake sampling), Phase 1 MS4 stormwater communities (Lexington and Louisville), the Ohio River Valley Sanitation Commission (mainstem Ohio River), U.S. Forest Service, U.S. Geological Survey, and other agencies. In 2000, nine agencies and universities signed a Memorandum of Agreement to share aquatic biological and habitat data through a common database that was developed, with some assistance from EPA (KYDOW, 2000).

Once the interagency agreements were basically in place, the monitoring subcommittee would meet each fall to discuss the monitoring strategy for each new basin management unit coming into the rotating cycle. In conjunction with this process, the DOW state watershed coordinator and basin coordinator worked with the basin teams on a Strategic Monitoring Plan for each basin, which documented what types of sampling would be done in which locations during the first two years of the basin cycle. The intent of these monitoring plans was to:

...carefully consider agency resources and capabilities, taking into account where and when each was conducting field work in order to make the best use of available resources and collect the best information at the least cost. (KYDOW, 1999)

Another objective of the strategic monitoring strategy was to take a multimedia approach that considered groundwater, water quality and quantity, biology, toxicity, fish tissue, and sediment.

The strategic monitoring plans developed by the basin teams were not necessarily fully implemented by the DOW's monitoring staff, in part because the agency's monitoring resources were already designated for specific tasks based on programmatic agreements with EPA. Also, while some staff and program managers were enthusiastic about aligning with the watershed framework, others were more resistant to changing their way of doing things based on the basin teams' input:

The problem is that field staff felt they never had much of a role in developing that monitoring strategy, so when this team came up with the strategy, the tension was that DOW people who usually dealt with that strategy said "That's not what we want to do." So there was this tension in trying to coordinate that, and the DOW staff didn't recognize these river basin teams as having any authority over what they did, so even though management, the director's office, is saying "we're going down this path, here's the plan, here's what we're doing," there was always this tension about the framework process driving what the DOW does.

Another aspect of monitoring which was tied to the basin cycle but occurred largely outside the interagency monitoring strategy was the Watershed Watch volunteer

monitoring program. Since 1985, the Division had managed a Water Watch program which predominately supported school-based water quality monitoring for educating and involving the public in water issues. In 1997, several factors converged to allow for a new adult-focused Watershed Watch program, managed by an independent nonprofit organization, which greatly expanded volunteer monitoring efforts in the state. A Sierra Club chapter in the state was interested in starting such a program and had received funds from a court settlement that they were able to direct to this purpose. DOW worked with the Sierra Club and the Kentucky Waterways Alliance to design a program that trained volunteer monitors in certain state protocols and supported several large volunteer sampling events in the first year of each basin cycle. From DOW's perspective, the program would help provide a broader snapshot of watershed conditions to feed into the basin assessment and prioritization process. It also would educate and engage a larger group of citizens who might go on to provide leadership in local watershed planning and implementation.

As each new basin was incorporated into the management cycle in the first 5 years, Watershed Watch groups were trained and initiated into monitoring in 8 basin regions of the state. Although the program was initially envisioned as a one-time snapshot in the first year of the basin cycle, the volunteers who were trained in each basin wanted to continue the program on an ongoing basis. The program took on a life of its own in the nonprofit realm, while DOW has continued to offer some technical assistance through the Water Watch program (KY Watershed Watch, 2010). In addition, basin coordinators have played important roles assisting the Watershed Watch groups in data management and other support functions.

Some of the groups have been frustrated over the years because of their expectation and desire for DOW to use volunteer data more in their formal assessments of water quality use attainment and impairment. Because these assessment decisions must be legally and scientifically defensible, there are high standards for quality control in how data is collected and managed, so volunteer data has been used more as a screening tool

to identify areas where the agency should do further monitoring. In 2004, the agency released guidance which clarified the data quality standards for various agency uses and provided options for groups to develop rigorous Quality Assurance Project Plans and monitoring protocols if they wanted their data to be considered in agency assessment decisions. As one basin coordinator shared:

What I tell the volunteers is “We are training you and providing you with lab analysis that you can use at your local level”, and that is really the usefulness and utility of the Watershed Watch data, is for citizens to know the conditions of their water, and to hold their local officials accountable in situations where there need to be improvements.

On the flipside, the Division’s hope that volunteer monitoring efforts would morph over time into local stakeholder groups to support watershed planning and implementation was not necessarily realized. From one manager’s perspective:

One of the goals of watershed watch in the beginning was to develop local interest in the watershed, let them get out and collect data, learn what's in the watershed, learn some of the language that is associated with watershed and the science and so forth, and then you come along with the framework and start trying to develop those groups. They didn't see it that way. They wanted to go out and collect data and say, “Here, Division of Water, here's this information we collected that says these streams that are bad, what are you going to do?” We're turning around and saying “How can you help us in your local area?” It's kind of a back and forth, not a fight, it just didn't go anywhere. That was a problem right off the bat that we were counting on as a help, and it was the opposite.

### Prioritization

The third step in the basin planning cycle after monitoring and assessment was prioritization of watersheds for action planning. The Kentucky Water Resources Research Institute, with some input from DOW, developed a prioritization formula to objectively rank all the 11-digit HUC watersheds in a basin based on their potential for either watershed protection or restoration activities. The formula used GIS coverage data on water quality and a number of environmental indicators to compute the rankings for each watershed. For example, the protection score for each watershed was calculated

based on a weighted average for categories such as wetlands, drinking water areas, groundwater sensitivity zones, nature preserves, and other factors. The restoration score was calculated based on observed impacts (% of impaired waters) and potential impacts, which included categories such as potential fertilizer loading, pesticide loading, contamination sites, discharge violations and other factors. The prioritization methodology, described in a 48-page guidance document, was quite technically complex and ambitious in aiming to comprehensively prioritize based on environmental data indicators (Ormsbee & Colton, 1997). In addition to the priority rankings, a set of *targeting* criteria was created to get at feasibility factors for local watershed protection and restoration activities, such as public support, data availability, and program-specific funding availability.

The developers of the prioritization formula generated the priority ranking scores in year 3 of each basin's cycle. The formula categorized watersheds as low, medium, or high priority based on protection and restoration scores. Then, the task lay with the basin teams to weigh the priority rankings with their knowledge of local interests and feasibility factors to select priority watersheds. Some of the basin teams were very focused on the numbers, debating what they meant and how they should be used, while others used the formula as a general guide, focusing more on their sense of feasibility. Following the framework guidance, the basin teams selected at least three priority watersheds in which to focus action planning efforts, although some teams selected as many as six. As part of the prioritization phase, some form of a basin assessment report was posted online, with summary information for each 11-digit HUC, as well as a brief description of the priority watersheds and why they were selected (e.g. KYDOW, 2002). The outcomes and evolution of the watershed prioritization process are discussed in Section 4 of this case.

#### Planning & Implementation

According to the watershed framework document, the fourth and fifth years of the cycle were designated for developing and implementing action plans. The framework

called for creation of a basin management plan, as well as local watershed action plans for priority watersheds. This outcome was only accomplished in the first Kentucky River Basin cycle. In that basin, the coordinator and basin team held a number of workshops with stakeholders in priority watersheds to mobilize local watershed task forces. A 429-page basin management plan was compiled and published online, which had several components (KWRRI, 2002). One section provided 2-page watershed assessments for all the 11-digit HUCs in the basin, organized by region. Another section presented a basin overview and initial action plans for the three priority watersheds. The other major section gave a programmatic review of different water-related agency programs of DOW and other partners, summarizing the internal process each program used to prioritize its management activities. This portion required the most coordination between the state watershed coordinator, DOW programs, and agencies on the basin team, to get different agencies to contribute content to the basin management plan.

Generating the Kentucky River basin plan was very resource intensive, and though some of the other early basins worked towards a basin plan, they did not produce anything comparable. Some of the State Steering Committee members and other agency partners questioned the value of the basin plan that was produced, since it was not particularly strategic or successful in targeting interagency resources towards priority problems. While some agencies had been willing to contribute information on their programs, they were generally not comfortable making commitments to specific implementation actions for the priority watersheds as part of the basin cycle. The other basin teams posted their basin assessment reports with a brief basin overview and summaries for the 11-digit HUC watershed, then went on to focus their energies on stakeholder engagement and action planning in the priority watersheds.

Based on the rotating basin model that had been implemented by other states, DOW made an attempt to incorporate NPDES permitting into the final implementation phase of the 5 year cycle. As the framework was developed, the basin management units were designed to enable a relatively even workload of permits each year, with permit

issuance synchronized by basin. In the early years of the basin cycle's implementation, DOW started issuing shorter term (2-3 year) NPDES permits to get them aligned with the rotating basin cycle. Unfortunately, the process ended up being counterproductive, contributing to what one manager described a “perfect storm” of stresses leading to a major NPDES permit backlog. In the late 1990s, Kentucky had one of the top performing programs in the country in terms of issuing NPDES permits on schedule, with the least amount of permit backlog. In the years that followed, three factors combined to create a major permit backlog: the new workload created by trying to synchronize permits on the basin cycle, a switch to a new agency database for electronic document management, and significant loss of experienced staff in the permitting program through retirements. Thus, although many of the permits did become aligned with the basin cycle through these early efforts, the program's emphasis has been on dealing with the staffing and backlog problems, not on the watershed framework.

TMDL development was not formally built into the basin planning schedule but efforts have been made to coordinate TMDL development with monitoring and assessment activities and with input from basin teams. Since Kentucky was not a TMDL lawsuit state, there was not the amplification of staffing and technical capacity to develop TMDLs that happened in many states that faced court ordered schedules. TMDL development has proceeded at a fairly slow pace with the limited resources available at DOW and through EPA support. The program has prioritized areas for TMDL development based on input from basin coordinators and basin teams on where stakeholders are more likely to implement the TMDL through watershed planning and improvement activities.

## **5C.4 Changes, Challenges & Evolving Strategies**

### Organizational Changes

The Division went through a number of organizational changes from 2002-2008 which affected the watershed management framework's implementation in the second cycle and beyond. From 1997-2002, the framework activities had been largely driven by

the state watershed coordinator position in the Director's office. This required keeping a number of balls in the air simultaneously – coordinating monitoring and assessment activities among the interagency Monitoring Subcommittee, the basin teams, and the DOW monitoring program; working with other DOW program managers to encourage alignment with the framework; convening the Statewide Steering Committee; applying the prioritization formula to each basin; and ensuring that basin teams and coordinators were in place and moving on schedule. Trying to get other programs engaged in the watershed framework was challenging, in part because of the historical culture of the programs being run very independently. Many of the program managers had been there for decades, and some were resistant to changing their mode of operation to support the watershed framework. The state watershed coordinator had tried to encourage some organizational changes to institutionalize the watershed framework, but the time was not ripe for this until a new Director came on board in 2002.

In 2003, the Division went through a significant reorganization which moved a number of programs around and created a watershed management branch. The new watershed branch consisted of the basin coordinators section, the nonpoint source program, and the water quantity management programs. The watershed branch manager and new basin coordinator supervisor, who had been one of the first basin coordinators, led a process with the State Steering Committee in 2004-2005 to evaluate the watershed framework for possible revisions (KYDOW, 2004). The steering committee generated an initial list of what was working and what was not working. A subcommittee followed up on these points, looking into some other states' models, and generating a set of recommendations and key issues to address. While there was some discussion of these issues among the steering committee in 2005, the momentum to revise the framework and address unresolved issues dissipated with another series of organizational changes at DOW.

The driver for many of these transitions has been the retirement of most of the DOW's senior managers who had been there since the environmental agency's inception



in the early 1970s. The state made some changes to its retirement policies which prompted senior managers to retire early by a specific date in order to maximize their benefits. In recent years, DOW lost around 30% of its workforce to retirement. Although many of these positions were filled through new hires, there was a significant loss institutional knowledge and program experience. There was a complete turnover, sometimes more than once, in many of the branch manager and other program manager positions. Within the watershed management branch, the seasoned basin coordinator supervisor retired and the replacement had no prior experience with the watershed framework and stayed for only two years. In addition, the agency Director changed in 2004 and again in 2007. In 2008, a significant reorganization was implemented to better deal with the new personnel resource constraints.

Amidst the shuffle, the work of the basin coordinators to support watershed initiatives has continued, but many of the formal framework elements and overarching direction subsided. As program managers changed places or were hired from outside the Division, they were not necessarily informed or engaged in the watershed framework process since there was no longer framework leadership out of the Director's office. The 5-year rotating basin schedule for monitoring continued at DOW, but the interagency meetings each fall to design the monitoring strategy discontinued, and basin coordinators and teams were not kept in the loop of monitoring decisions. Several products that the framework document charged the basin teams to develop each five years – basin status updates, strategic monitoring plans, basin plans or assessment reports – were dropped. In part, this was due to the fact that the agency and Statewide Steering Committee never decided on a new format for what types of reports or products would be useful from the basin cycle. However, it also reflects an organic shift in emphasis from agency-driven planning at the larger basin scale to more targeted stakeholder-based planning and action in smaller watersheds, consistent with EPA's focus in the nonpoint source program and Region 4's priority watershed restoration focus.

### Framework Challenges

Although some of the fading of the framework's influence can be attributed to managerial turnover, much of it also stems from the persistent challenges and the lessons learned from the first full cycle of implementing the watershed framework. Perhaps the greatest frustration and learning revolved around the agency's priority watershed process. In the priority watersheds selected, the local stakeholder engagement, planning and implementation process proceeded much more slowly than the orderly 5-year cycle that the framework set forth. Thus, in the second cycle basin coordinators kept working in some of the original priority watersheds and did not really have the capacity to take on new priority watersheds for a number of years. In a number of other cases, the priority watersheds never materialized into local stakeholder action, due to problems discussed below. In the first cycle, the complex prioritization formula was calculated for the basin teams by the state watershed coordinator and Kentucky Water Resources Research Institute, but in the second cycle basin teams were mostly on their own to figure it out. Several of the basin coordinators and teams found the original data-driven prioritization process overly complex and cumbersome. They opted instead to select priority watersheds based on local interest and feasibility considerations, identifying water quality protection or restoration needs to work on with interested stakeholders.

The priority watershed efforts have had mixed results. The most progress has occurred where there have been existing, or at least budding, stakeholder efforts that the basin coordinators have helped nurture along, particularly in the Kentucky River and Licking River basins. As one coordinator who has been able to work with a number of groups on watershed initiatives expressed:

...that really has been how I have been successful in anything I've done is I look for groups that are already doing things, or are interested in similar things, and I try to participate in what they are doing and see if there is any interest in branching out or splintering off and working on watershed issues.

In some of the more rural areas, such as parts of the Upper Cumberland and Green-Tradewater basins, basin coordinators have had difficulty finding local stakeholders that

are interested in working with the agency to address watershed problems. As one coordinator noted:

That was the idea, to try to develop local watershed groups - that was the dream in the beginning, that we'd be able to go out and find different seed organizations here or there, that we could bring along or even develop from scratch, and get them involved in the watershed planning. That was the big dream, and in some ways it might have played out a little bit but in a lot of areas...that are very rural and lower income, very poor, it didn't work out very well.

The challenges in some of the failed priority watershed efforts yielded an important lesson learned regarding agency-driven watershed approach strategies. In deciding priority watersheds in which to focus, the feasibility factors tied to presence of engaged stakeholders really trump the more data-driven risk-based targeting approach. As two managers reflected:

If there's no one there to actually be involved and do the work, you can't just be prescriptive for people that aren't going to be involved in the process, and are unwilling for whatever reason. So we had a few lessons that the process needed to, on the front end, take a look at the capacity that was there in the local area and the willingness of stakeholders to work in a watershed planning process.

There is an assumption [in the framework] that you can just go into a watershed and make something happen, and you can't. I may have gotten some things to happen someplace, but that is because it was about to happen anyway, and I just facilitated it. You cannot go into a watershed and create a group; you cannot. The prioritization process pushed you towards that. Now, you can go through there and prioritize what your worst watersheds are, but if you don't already have a group or the seeds of a group, you can't go into that watershed and make a group and get something done.

One of the chief challenges to supporting priority watershed initiatives has been lack of consistency in some of the basin coordinator positions. The basin coordinators help keep the coordination and momentum going, facilitating connections among agencies and stakeholders to and shepherding along watershed planning and implementation projects as needed. For example, the basin team in the western Four Rivers area had strong interagency coordination on projects for a number of years but has

been challenged more recently with multiple turnovers in the part-time contract basin coordinator position. The Salt and Big Sandy basins had some initial watershed efforts going, but most of those have floundered with the loss of the basin coordinator positions. In the Salt basin, Cooperative Extension discontinued the contract due to resource constraints. The Big Sandy coordinator at DOW retired, and there have not been resources to fill the position. Thus, of the six full-time and one part-time basin coordinator positions initially established in the framework's first cycle, only two full-time DOW coordinators and two part-time contract positions are currently in place. So far, the prospects for filling these positions have been eclipsed by the agency's more pressing staffing needs in core regulatory functions such as NPDES permitting and compliance inspections.

Shifting to the other framework coordination mechanisms, the State Steering Committee and basin teams endured for a number of years but have waned more recently. Several factors may contribute to this reality. For years, the biannual steering committee meetings were quite well attended, though some key agencies that had initially signed on to the framework were virtually inactive. The committee had participated in evaluating and making recommendations for the framework around 2004-05, but changes were not formalized and a new direction or vision was not set forth. The committee and its agenda had been largely DOW driven, with other agencies showing up, sharing information, and discussing issues. There did not seem to be collective interagency ownership of the framework and its direction, so when DOW's leadership was in flux, the committee did not meet. One manager reflected on some of the challenges of the steering committee:

I think the steering committee has really been a challenge, one to keep it going, and to get active participation, not just talking about what you think about it, but actually steering at something. I think that's partially our fault for not scheduling and having regular meetings to keep people engaged, but also we were the only ones having meetings. It became the tell-us-what-you-think-the-division-should-do kind of meetings, and we don't always do what people tell us to do anyway, so the steering committee wasn't really steering anything.

In the committee's meetings, the agencies repeatedly discussed the need to target interagency resources towards priority watersheds, but there has not been much success in achieving this yet. Around 2006-07, the committee received a directive from the environmental department's Commissioner at the time to focus collective agency resources on areas where there was a nexus with human health risks. The agency identified a list of watersheds that were connected to impaired drinking water sources and from these the State Steering Committee selected five "focus watersheds" in the state. Unfortunately, collaborative efforts to develop stakeholder initiatives in these watersheds only materialized in two of the five watersheds, in part due to loss or turnover of basin coordinators in some of the areas. To some degree, the focus watersheds effort lacked momentum because DOW managers that might have shepherded the interagency efforts along have been attending to other priorities. This reinforces the need to shift beyond the DOW-driven dynamic to a more collective ownership of interagency coordination efforts. One manager noted an air of frustration surrounding the failed attempt at resource targeting:

We asked for these focused watersheds, and I think they thought that by making them a focus they would get better, and they haven't all magically become de-listed in the short term. I think that was really frustrating, and that makes it hard to stay involved when you're not seeing immediate changes, that things aren't getting better just because we decided that we would all work towards this one watershed.

Despite these challenges, the managers interviewed generally felt that having a high-level forum for interagency coordination and resource targeting is still very important, but that the dynamic and direction needs to be transformed in some way.

The other coordination forum, basin teams, has faced some similar challenges. The basin teams were very important in early implementation of the framework, but their role and direction has become less clear over time. In some areas, the basin teams continue to meet regularly, while in others the basin coordinators either stopped convening regular meetings or there was no basin coordinator to convene the teams. Some of the basin teams struggled with a similar passive, DOW-driven dynamic that the

State Steering Committee faced. Team members were willing to show up, participate, and share information but did not initiate or lead collaborative actions in the basin. As basin coordinators focused more on stakeholder initiatives in priority watersheds, the basin teams tended to have little involvement except perhaps through one-on-one coordination with individual members. One basin coordinator noted that the drive and direction for agency staff to contribute to basin teams used to come from higher level representatives on the State Steering Committee, so that momentum has been lagging. Another challenge was that while basin team members contributed time and brought valuable technical expertise, they often did not have enough decision making authority in the agency to commit agency resources towards specific watershed priorities.

Many of the basin cycle tasks originally delegated to the teams are no longer being conducted, such as the development of basin status updates, strategic monitoring plans, and basin management plans. A couple of the basin teams saw the basin status reports as useful outreach tools and have tried to update them, but this has been challenged by lack of funding for printing the reports that was available in the first cycle. One of the key roles of the basin teams was to help select and support priority watersheds. The basin coordinator unit at DOW has been developing a new, simpler process for prioritization based on where there is stakeholder interest to improve impaired watersheds. Perhaps when this process is determined, the basin teams will be reengaged in a new phase of priority setting. Although the managers interviewed did not speculate on the future of basin teams, it is possible that the formalized teams have served their purpose and that more targeted interagency efforts around specific priority watershed initiatives will prove more useful. The future role of the basin teams and State Steering Committee will be something for DOW and agency partners to decide in the time ahead.

#### Evolving Strategies

Despite these challenges with the framework and resource constraints, the agency has pursued other internal strategies to enhance watershed protection and restoration efforts. The current leadership recognizes the longstanding siloed culture in the agency

and the need for more horizontal coordination across water programs. While much of the thrust of the 2008 reorganization involved streamlining the branches to better address resource constraints, some changes were also made to break up silos and promote watershed integration. An inter-branch watershed implementation group has been meeting for several years on a quarterly basis to pursue cross-program watershed strategies with all the program branch managers and select section supervisors. As part of this process, a representative from each branch now has a chance to give input on each nonpoint source watershed plan that is submitted before it is approved. In addition there are meetings every two weeks between the watershed management branch and the TMDL program to help target TMDL-related monitoring and development to areas where there are stakeholders interested in implementing them and to make sure nonpoint source grants are helping to implement TMDLs.

The nonpoint source program has shifted most of its funding to watershed planning and implementation in priority watersheds, moving away from its historical focus on demonstration projects that were scattered around the state. Putting the basin coordinators and nonpoint source programs together in the watershed branch has helped to strengthen that connection in recent years. The nonpoint source program has been wrestling for a number of years with what a watershed-based plan should look like in order to meet agency approval. The agency worked with the nonprofit Kentucky Waterways Alliance on a watershed planning guidance document which has been piloted in 4 watersheds in the state (Kentucky Waterways Alliance, 2010). It is hoped that these watershed plans will generate successful, funded implementation efforts that can serve as a model for other watersheds in the state. The agency is also using nonpoint source funding to work with partners on a Kentucky Watershed Leadership Academy training program, which is intended to “train local leaders and provide them with the tools and skill sets to successfully champion the development and implementation of watershed-based plans” (KWLA, 2010).

The interface between the basin coordinators and the nonpoint source program seems to be the arena where the agency is able to offer the most support to on-the-ground watershed approach efforts with local stakeholders. One basin coordinator who has assisted some of the pilot watershed planning projects noted an important lesson from the process, with broader relevance for agency watershed approach efforts:

What I've learned is that each watershed is unique, and working with these three groups has internalized it for me. They are all different groups, they have different strengths, and they all had different approaches and different opinions on what needed to be done. But they have all come to a conclusion that is going to lead them to make improvements in water quality. I don't know how you write that into a framework, but there really needs to be more recognition of that, and more effort to accommodate that.

The future structure of Kentucky's watershed approach is still under consideration at DOW, though at the moment it is taking a backseat to other needs and pressures in the agency. There is not a consensus on how the framework needs to be revised, based on the lessons learned over the past decade, to make it relevant and useful for the years ahead. When asked what changes should be made to the framework, some of the basin coordinators shared some illuminating and distinct perspectives:

I don't know the answer to that. I've tried a million different ways of thinking about it and talking about it a million times in our staff meetings, and if I had a dollar for every time I heard "OK, we're going to sit down and revisit this framework and redo it" I wouldn't have to work anymore. It's just been a continual frustration over the last 4-5 years, and I just think sitting down and looking at it and looking at what we do, what didn't work, what could work, and then dictating some of that back to the agency, what we need, we never did that.

The framework principles were good, it just didn't turn out quite like it was expected. We do need to go through the process of management review and adaptive management on a regular basis, and try to improve how we approach these things, but it has been far more case by case than originally thought. You can't cookie cutter a watershed program. People change, priorities change from one place to the other, and you have to adapt to that. I don't have a master plan. I still work within the framework, just differently.



In spite of the resource and stakeholder engagement challenges, there was a general sense among managers interviewed that having basin coordinators throughout the state is important. There is some fuzziness, however, surrounding the role and direction of the basin coordinators, since the framework has not been updated to reflect current practice and new directions. Although the basin coordinators meet with their managers on a monthly basis, there is not much communication between the basin coordinators in the field and many of the agency's other program areas, such as monitoring and permitting. Since many of the newer program managers in the agency were not part of the watershed framework's development and implementation, they may not have a clear sense of what the basin coordinators do and how to effectively interface with them on specific watershed issues. As one basin coordinator reflected:

We're not in permitting or enforcement, you know they've got all these numbers and commitments that our office is supposed to meet, and people understand that. Where we're out here doing something very different – we're not selling, we're not communicating what it is we're doing and what kind of things we need help with from the other groups, or how we might help them.

Developing an effective sales pitch for the vital contributions of basin coordinators, as well as an updated, more realistic vision for what they might accomplish in the future, may be key for securing resources to continue their work statewide in the years ahead.

## **5C.5 Reform Outcomes**

This section summarizes and discusses some of the accomplishments and challenges of the agency's watershed approach strategies, in relation to the four reform dimensions of this study. Additional discussion of key issues as they relate to the EPA context, other state cases, and the reform literature is provided in Chapter 6.

### **Integrated Management**

In 1996, DOW led an interagency effort to develop a new framework for integrated watershed management in the state. The framework was largely designed around the rotating basin management model featured in EPA's watershed approach guidance for states. Five basin management units were defined and incorporated into a

five-year cycle that involved monitoring and assessment, prioritization, planning, and implementation. Although the cycle was meant to encourage internal coordination of DOW's water programs, it mostly affected monitoring and assessment, and there was difficulty getting other water programs to align their activities with the cycle. A watershed management branch was created in 2003 to encourage more integration among the basin coordinators, nonpoint source, and water quantity programs. In recent years, the agency's leadership has pursued further reorganization and regular cross-program meetings to pursue watershed strategies and a more integrated organizational culture.

A unique innovation of Kentucky's framework was the establishment of ongoing coordination mechanisms to foster integrated management among agencies and stakeholder groups at the state and basin level. The Statewide Steering Committee met twice each year, bringing together representatives from a broad group of state and federal agencies, universities and stakeholder groups to share information, discuss common goals, and guide the unfolding of the watershed framework's implementation. Basin teams with technical expertise from key agencies and organizations in the basin were convened at least quarterly, with the charge to help guide the 5 year cycle of monitoring, prioritization, planning and implementation in each basin. The state and basin forums were in most cases driven by DOW managers and have waned in recent years as DOW has been in constant managerial transition and focused on other priorities. Moreover, the coordination forums faced difficulties in moving beyond discussion of issues to generate substantive agency commitments to collectively target resources in priority watersheds.

#### Collaborative Management

The state and basin coordination mechanisms were established to foster collaborative management which would, in theory, trickle down to support stakeholder-based planning and implementation in priority watersheds. The framework set idealistic goals that basin coordinators and teams would be able to mobilize local watershed task forces and action plans for priority watersheds in the fourth and fifth year of each basin cycle. The agency hoped citizen engagement in watershed task forces would also be

bolstered by the Watershed Watch volunteer monitoring program that was aligned with year 1 of the basin cycle. In practice, stakeholder engagement took much longer to ripen into watershed planning and implementation. Efforts by basin coordinators to engage stakeholders were generally not successful in areas where there was not already some local interest and capacity to take action. Through some frustrating failed attempts, several of the agency managers involved internalized the lesson that you cannot simply go into a watershed and make something happen.

Where there has been local interest, basin coordinators have played important facilitating roles in connecting stakeholders with sources of technical assistance and support. Basin coordinators have been active in the Watershed Watch programs and offer critical technical support, for example in helping to manage the volunteer data. A key limiting factor in the agency's support of collaborative watershed action at the local level is the lack of funding for more basin coordinator positions. DOW has lost two full-time basin coordinator positions and at this point the priority for hiring is directed to some of the resource strapped regulatory functions, such as permit writers to relieve the significant permit backlog and compliance inspectors in the field offices. The nonpoint source program is also taking steps to support the capacity of local stakeholders to engage in watershed planning and implementation, through recently developed and piloted watershed planning guidance and a watershed leadership academy program.

#### Adaptive Management

Kentucky's watershed management framework laid out an iterative 5-year cycle of monitoring, planning, and implementation, which was not termed adaptive management but reflected some of its principles. Many have acknowledged the greatest success of the watershed framework to be the strides made to increase water monitoring in the state through coordinated interagency efforts. The framework's charge to create basin plans and local watershed action plans as part of the 5 year basin cycle has been replaced by ongoing efforts by the basin coordinators to support watershed planning and implementation in priority watersheds. When certain priority watersheds get far enough

along in implementation, the basin coordinator can take on new priority watershed initiatives. The 5-year cycle has been acknowledged as good for monitoring and assessment but too short for planning and implementation. There have been many rounds of discussion and debate, both in the agency and in the State Steering Committee, about revising the watershed framework to reflect current practice and new priorities. However, the agency has been focused on more pressing issues related to resource constraints and has not yet engaged agency partners in setting a new course for the agency's watershed framework. Thus, adjustment based on lessons learned has happened organically in practice but not formally as a consensus direction to improve outcomes.

#### Results-Oriented Management

Kentucky's watershed framework put a major emphasis on identifying priority watersheds for focused action planning and implementation. Significant effort went into developing and applying an intricate prioritization formula for ranking watersheds based on a host of environmental indicators related linked to either protection or restoration priority. The formula generated a ranking of all HUC-11 watersheds in a basin, categorizing them as low, medium, or high priority. Basin teams were to weigh these rankings with feasibility criteria, such as local interest and capacity to address problems. However, as the prioritization was implemented, a number of priority watersheds were selected where there was little local interest, and basin coordinators had difficulty getting stakeholder initiatives off the ground in many areas. After the first cycle, most of the basin coordinators and teams either kept working on the initial priorities or selected some new priorities where stakeholders were active, setting aside the prioritization formula which many found complex and cumbersome.

Setting priorities in order to achieve environmental results draws its power from the collective targeting of resources in priority areas. This has been the overriding but ever elusive goal of interagency coordination efforts through the Statewide Steering Committee and basin teams. The most recent identification of "focus watersheds" that targeted impaired drinking water sources constituted a step towards interagency targeting

but implementation efforts floundered at the local level in all but a couple cases. It seems that the agencies in Kentucky are still trying to figure out an effective structure or process for making this happen, though these discussions are on the back burner at the moment. Nonetheless, the agency has been working internally and with EPA Region 4 to target nonpoint source grants towards watershed planning and implementation of TMDLs in areas where there is greater likelihood of achieving measurable results. At the same time, the agency has learned from over a decade of trying that these steps towards measurable results often take a number of years to materialize, particularly when funding mechanisms and regulatory drivers to spur local implementation are lacking.

## **Chapter 6: Cross-Case Discussion and Conclusions**

### **6.1 Introduction**

By the last decade of the 20<sup>th</sup> century, many scholars and practitioners alike were in agreement regarding the need for environmental governance reform. The suite of sweeping command-and-control environmental laws passed in the 1970s produced much progress in controlling the relatively more tractable point source pollution problems. However, both conventional wisdom and the research literature suggest that the problems that remain are more complex and must be addressed by a network of entities at federal, state, and local levels. In water policy, these problems include the cumulative effects of nonpoint source pollution and habitat degradation from dispersed activities across the landscape; the conflicting demands on limited water resources to meet multiple human and ecological demands encompassing both water quality and quantity; and the need to implement new water infrastructure, policies, and practices that are adaptive to the growing challenges of climate change. With persistent and emerging problems not well addressed by the existing environmental management framework, arguments for reform and innovation have arisen on multiple fronts.

The growing literature on environmental governance reform principles can be distilled into four main dimensions, which were reviewed in Chapter 2. First, there is a need for integrated management of ecological systems, with greater coordination across fragmented institutions which govern different components of these systems. Second, environmental management must move beyond an agency-driven paradigm to engage a broad array of stakeholders and citizens in collaborative management of shared resources. Third, the complex, dynamic, and uncertain nature of ecosystem dynamics, and human impacts on them, must be better addressed through adaptive management approaches that foster rapid learning and adjustment to improve management strategies as knowledge, conditions, and needs change. Fourth, agencies need to improve efficiency and effectiveness in achieving environmental outcomes by shifting from a rigid, procedural

focus on program outputs to results-oriented management strategies. In the realm of water policy, these principles have been packaged by EPA and others in the concept of a *watershed approach*.

Despite the theoretical appeal of these reforms, there are significant challenges in moving from principle to practice. Wide implementation gaps have been noted in each of these reform dimensions. While there are scientific and technical complexities associated with environmental governance reform, the most significant impediments tend to be social and institutional. Many of the challenges revolve around trying to pursue reform strategies within the same fragmented policies, bureaucratic structures, and agency cultures that the reforms seek to transform. Scholarly attention has focused on new *adaptive governance* institutions at local and regional scales, which have emerged to more effectively address the unique problems of specific places (Brunner, 2005; Scholz & Stiftel, 2005). While these place-based innovations are essential, more attention is needed on how reform can also be pursued within the institutional constraints of federal and state agencies that continue to play a central role in environmental management.

#### Review of the Research Problem:

The watershed approach has been emphasized as a critical reform arena to better address environmental problems through integrated, collaborative, adaptive, and results-oriented management strategies. However, putting these principles into practice within the constrained contexts of implementing agencies is often fraught with institutional challenges. State environmental agencies may be important laboratories for these innovations, serving as bridges between top-down federal policy structures and bottom-up local governance efforts. However, little research has been done on the process and outcomes of state watershed approach reforms to assess the extent to which these institutional barriers have been or can be overcome.

The overarching aim of this research was to explore how key environmental management reform principles can be effectively put into practice within the constrained environment of implementing agencies. Towards this end, the purpose of this multiple case study was to describe and assess state agency implementation of the watershed approach reform within the context of environmental federalism. Chapter 4 reviewed the

national policy context for state watershed reforms, including the Clean Water Act's fragmented programmatic structure for water quality management and EPA's strategies to promote the watershed approach on a national level and at Region 4 in the southeastern United States. Chapter 5 presented case studies of the evolving watershed approach strategies of state water quality agencies in North Carolina, Georgia, and Kentucky, from the initial adoption of state watershed frameworks in the 1990s through 2009 when case data collection occurred.

This concluding chapter offers a cross-case discussion of the research findings, focused on addressing the study's three overarching research questions:

- 1. How have state agencies operationalized the watershed approach reform through specific management strategies over time?**
- 2. What contextual factors at the federal and state level helped to shape state agency reform strategies?**
- 3. What have been the reform outcomes in terms of progress towards more integrated, collaborative, adaptive and results-oriented management?**

Much of the detailed description and analysis of the EPA context and state watershed approach strategies has already been presented in Chapters 4 and 5. Thus, the focus in this concluding chapter is on synthesizing findings across the EPA context and state case studies. Section 2 discusses the federal and state contextual factors that have helped to shape watershed approach strategies over time (RQ2). Section 3 summarizes the watershed approach strategies employed by states (RQ1) in terms of progress and challenges in each of the four reform dimensions (RQ3). Section 4 concludes by providing some overarching conclusions and recommendations regarding watershed approach reform efforts of state and federal agencies.

## **6.2 Role of Federal and State Context**

The major national environmental laws of the 1970s utilized an implementation structure based on "cooperative federalism", with responsibilities shared between federal and state agencies. The EPA is responsible for setting national standards, regulations,



and programmatic requirements, based on its statutory authorities. The implementation of these policies and programs is typically delegated to state agencies, with EPA providing state oversight through its regional offices. States negotiate program commitments with EPA regional offices as part of the federal programmatic funding they receive and are responsible for delivering and reporting on a litany of program outputs. Federal-state relations in environmental policy have grown increasingly strained, in part due to the burgeoning of regulatory requirements for state and local governments which many view as “unfunded mandates” (Scheberle, 2005). Federal funding for state environmental programs has been declining rather than keeping pace with the increased program duties and the massive looming water infrastructure needs. States often advocate for more flexibility and discretion to operate programs in a way that fits best with state needs and priorities, with less micro-management of programs by EPA (Fiorino, 2006; Scheberle, 2005).

While the Clean Water Act, Safe Drinking Water Act, and EPA policies to implement these statutes set the agenda for most of the core responsibilities of agencies, there is considerable variation in how the programs are operated from state to state. In addition, states can and often do implement additional state policies and programs to address water quantity, groundwater, wetlands, and other watershed-related functions that extend beyond federal requirements. Policy scholars have found that state contextual factors such as the nature and severity of problems, economic resources, and political culture shape the considerable variation seen in state environmental policy adoption and implementation (Lester & Lombard, 1990; Ringquist, 1993). Given their closer proximity to problems and discretion to go beyond federal statutes, the potential of states to institute progressive policies and serve as laboratories of innovation has been recognized (Sapat, 2004). However, there is considerable discrepancy in the resources devoted to environmental protection across states (Rabe, 2006). So, while some leading states push far beyond EPA minimum requirements, others struggle just to keep up with all the federal requirements, with inadequate resources for the task. The political

influence of state leadership and interest groups is another can also impact the scope and stringency of state environmental protection efforts.

This study used a conceptual framework, adapted from Scheberle (2004), for understanding state agency reform implementation within the context of environmental federalism (see Figure 4, p. 46). The framework depicts how state agency reform processes and strategies are influenced by a combination of EPA policies and oversight at national and regional levels; state contextual issues such as the nature of environmental problems, state policies, and economic resources available for environmental management; and factors within the agency which may drive or constrain innovation such as leadership, structure, culture, and role orientations of staff. These federal, state, and agency factors influence the design and adoption, implementation, and evolution of reform strategies over time. In turn, the types of reform strategies agencies implement make progress to varying degrees in the different dimensions of integrated, collaborative, adaptive, and results-oriented management. It is assumed from the reform literature that progress in these dimensions will lead to more sustainable watershed management outcomes. This section summarizes some key findings regarding the federal and state contextual factors which have played a role in shaping state watershed approach strategies.

#### EPA Context

There has been an interesting co-evolution between EPA and state watershed approach efforts. EPA's first guidance on the watershed approach in 1991 occurred around the same time that North Carolina adopted basinwide planning. EPA picked up on this innovation as a strategy by which states could institutionalize the principles of comprehensive, integrated watershed management. One of the designers of basinwide planning in North Carolina left DWQ and became a consultant for EPA, working with others to develop substantial guidance documents, lead trainings for state managers, and provide facilitation services for states that wanted to develop a watershed management framework. EPA provided grants to Georgia, Kentucky, and other states for these

facilitation services. In all, more than 20 states engaged to some degree in developing a state framework, and many of these adopted the rotating basin model, as it came to be known. Thus, the innovation was originated by a state, but EPA played a key role in diffusing the innovation to other states.

By the late 1990s, EPA's watershed approach became much more focused on the problem of impaired waters. The agency was under considerable pressure surrounding the wave of TMDL lawsuits that had been filed against EPA by environmental groups in many states. The Clean Water Action Plan in the late 1990s directed policy attention to the need for watershed restoration and engaged many federal agencies in regional coordination and stakeholder dialogues. The plan doubled funding for the nonpoint source program, with the new incremental funds dedicated for watershed restoration activities in impaired waters. States were required to do unified watershed assessments to identify priority watersheds for focused restoration efforts in order to be eligible for these funds. The focus on targeting impaired waters has persisted, but the grant guidelines evolved into requiring approved "9-element" watershed plans in order to receive nonpoint source grants to implement restoration activities. While EPA's voluntary guidance for watershed-based NPDES permits and TMDLs have had very limited impact on state programs, the nonpoint source program requirements have probably been the strongest incentive for watershed planning and implementation at state and local levels.

In the years since these changes were made, EPA has been under increasing pressure to bolster its strategic planning and performance management systems to demonstrate measurable water quality improvements from its program activities. Region 4 has used this results orientation to work with states and local stakeholder groups on targeted restoration efforts in priority watersheds, for example, through North Carolina's Use Restoration Waters program. A repercussion of this overriding emphasis on restoration has been that watershed protection strategies – which prevent waters from becoming impaired and are often more cost-effective than restoration – have received less attention and resources.

The institutional context at EPA for state water quality management is largely a structure of managing independent CWA and other statutory programs, each of which has a unique history, orientation, and set of programmatic requirements. The statutory programs are presumably intended to function together as a cohesive set of tools to protect and restore water quality. However, the focus on meeting individual program schedules and output requirements, which differ across programs, undermines the cohesiveness and effective integration in implementing the policy tools. In EPA's 2002 evaluation of state watershed approaches, states raised the issue of the barriers to integrated watershed management created by EPA's fragmented or "stovepiped" oversight of programs and heavy emphasis on individual program outputs or "bean counting" (EPA, 2002). In response to this feedback, the administrator for water at the time issued a memo "recommitting" to the watershed approach, outlining a number of strategies including increased support to states in their watershed management efforts. However, around 2000, the funding that had been dedicated to assist the regions and states in watershed approach strategies was redirected towards meeting TMDL requirements and has not reappeared. Thus, EPA's work with states to support watershed approach strategies has been limited to whatever the regional offices elect to provide.

Region 4's watershed approach strategies, while certainly not perfect and still evolving, demonstrate the steps that can be pursued when leadership is committed to experimenting with reform. By creating a high-level watershed management office that reported to the Director, Region 4 elevated the priority for cross-program integration and watershed-based work with states and local stakeholders. To do this, agency leaders had to be creative with reallocating existing resources in order to dedicate eight new state watershed coordinator positions and several other regional capacity-building positions with a watershed focus. Only through these changes were there roles dedicated to internal program coordination and accountable for pursuing water quality and watershed outcome targets that transcend individual programs. Furthermore, these positions provide the only vehicle for engaging with state and local efforts in a holistic way, beyond

individual program channels, to provide whatever assistance EPA can contribute to specific situations. Without prioritizing these collaborative channels, there is little opportunity for EPA to be constructively involved with, and learn from, watershed work as it happens on the ground.

As reviewed in Chapter 4, these reforms at Region 4 faced many implementation challenges, including resistance and frustrations from program staff, communication issues, and confusion surrounding mixed lines of accountability and conflicting priorities. It was a first step, and the agency has since proceeded with other steps and reform strategies to try to make the changes better institutionalized in the programmatic structure and culture that exists. Such steps to try new ways of doing things, even though there will be some turmoil, mistakes, and limitations in practice, are essential if any progress is to be made in agency reform. Even if the watershed outcome goals are only partially realized, such reform efforts are important for the learning they engender among agency staff, managers, and leaders who start grappling directly with how they can better address complex environmental problems within their tools and constraints.

Unfortunately, such reform gains are also fragile in a federal agency where managers change positions frequently and priorities are a moving target in response to shifting administrative agendas at the top and external pressures. Region 4's reorganization in 2008 to support reform efforts created a turnover in a number of managerial positions, including many of the state watershed coordinators. While moving EPA managers around is useful for staff development – and somewhat necessary given the mass retirement of senior managers – the high turnover can challenge EPA-state relations in program management. Each state agency has a unique history, contextual configuration, and direction to their programs that may not be appreciated and constructively supported by new EPA managers assigned to work with states. Some state managers also noted the challenges of inconsistency in EPA's frequently changing priorities and program guidance, with the priority watershed restoration focus described by one state manager as the “flavor of the day.” It remains to be seen how the new steps

taken by Region 4 in 2007-2008 to further institutionalize watershed approach reforms will be sustained with new agency directives and crises like the 2010 Gulf of Mexico oil spill demanding substantial resources and attention. Hopefully, some of the improved management strategies and institutional learning that has resulted from working on watershed approach reforms at Region 4 will take root and continue to grow despite these fluctuations.

### State Context

Variations in state context have been the predominant influence on the design and implementation of watershed approach strategies in the state cases. The three states have differed in the types of water problems that have driven watershed strategies and the extent and type of state policy action that has been taken to address problems. The institutional configuration for water management is unique in each state, and resource levels of the agencies vary considerably. Finally, the role of TMDLs in watershed management has played out differently in each state.

In North Carolina, the strongest driver for watershed reforms has been the problem of nutrients. Excess nutrients from point and nonpoint sources have deteriorated the ecological and economic resources associated with the state's estuaries and coastal areas. Periods of algal blooms, fish kills, and outbreaks of the toxic dinoflagellate *Pfiesteria piscicida* have fueled public concern, media attention, and state policy action by the legislature. In 1978, North Carolina's Environmental Management Commission adopted a special use classification into the state water quality standards for nutrient sensitive waters. The application of this designation to the Tar-Pamlico, Neuse, and other watersheds in the state has driven the agency's development of comprehensive nutrient management strategies. In 1995, the legislature set a 30% nitrogen reduction goal for the Neuse estuary and mandated the development of new rules for point and nonpoint sources to meet the reductions. In recent years, the state also mandated nutrient rulemaking for Falls Lake reservoir in the Upper Neuse basin which supplies drinking water for the City of Raleigh. Thus, the combination of a particularly salient watershed-

based problem (nutrients) and proactive policy action by the state have combined to give considerable momentum to watershed reform strategies in North Carolina.

For Georgia, the main water policy driver has been water resource limitations in certain parts of the state, and related impacts on water quality, that are exacerbated during times of drought. Droughts in the late 1980s prompted metro Atlanta municipalities to seek additional water supply from the Chattahoochee River and other sources. This spurred interstate water allocation conflicts with downstream neighbors, Alabama and Florida, which are still not resolved. In 1991, the state legislature passed a law requiring river basin water quality management plans to be developed statewide, which started EPD into its first statewide watershed approach framework. The state's early TMDL lawsuit filed by environmental groups and the resulting consent order put the agency on a whirlwind production schedule for TMDLs and TMDL implementation plans. By 2001, drought and EPD-imposed water withdrawal permit limits in two resource-strained areas of the state prompted the state legislature to work towards a new comprehensive state water plan. The state water plan's development from 2004-2007 and subsequent implementation has been the preeminent focus of EPD in recent years. There are still many unresolved conflicts and controversies among various stakeholders surrounding future water policy in Georgia which have been waiting in the wings during the past decade of planning, in hopes that the new regional planning structure will better address them.

Kentucky faces a number of environmental challenges related to inadequate wastewater infrastructure and nonpoint source pollution, but there has not been any particularly strong driver at the state level shaping watershed reforms. EPA's enforcement action to address combined sewer overflows in two of the state's major sanitation districts has created a driver for watershed approach strategies by those districts. In 1994, the legislature passed a progressive Agriculture Water Quality Control Act that carried some mandatory nonpoint source management measures for farms and the potential for enforcement through the Division of Conservation. However, some

DOW managers interviewed felt that the potential of this policy tool to fuel watershed improvements has not yet been realized. The state's watershed framework was driven by DOW but was also empowered by the willingness of many agencies and organizations to participate in its development and early implementation. Presumably, the agencies perceived the value of coordinating efforts and resources for greater positive impact in watersheds. However, the framework's effectiveness may have been hindered by the lack of a larger state policy or executive decision body giving it momentum. In many parts of the state such as more rural and economically depressed areas, the lack of sufficient local interest in working on watershed issues, coupled with limited state resources to fund implementation, has constrained the framework's impact. The framework's coordination mechanisms have also waned in recent years, in part due to the agency's internal focus on adapting to a slew of retirements, managerial turnover, and resource constraints.

The three states' watershed approach strategies have also been shaped by different institutional configurations for water management and markedly different resource levels. Water management functions are more fragmented among different agencies in North Carolina, which makes program coordination weaker and more challenging. DWQ holds water quality programs for surface and groundwater, but separate divisions implement programs for water resources/quantity and drinking water. DWQ's staffing to manage its water quality program responsibilities was around 450 in 2009. Georgia and Kentucky have the coordination advantage of all major water programs being consolidated in the agency, but with significantly lower resources to implement them than in North Carolina. Georgia EPD's Watershed Protection Branch houses all water quality, drinking water, and water quantity programs with a staff of approximately 300, plus around 50 water-related staff in the district offices. Kentucky's DOW also manages all water quality, drinking water, and water quantity programs, with a current staff of around 225. Thus, North Carolina DWQ has twice the amount of personnel as Kentucky DOW, while DOW also manages programs for water quantity and drinking water. Outside of DWQ, North



Carolina also has relatively massive funding watershed mechanisms in the Clean Water Management Trust Fund and Ecosystem Enhancement Program that dwarf the state's 319 nonpoint source program funds. In Georgia and Kentucky, however, the 319 nonpoint source program is the main state funding source available for watershed efforts, outside of other traditional federal cost-share programs.

TMDL requirements have played out very differently in the three states. Georgia was the only state studied which faced a lawsuit resulting in consent decree requirements for rapid mass production of TMDLs and later TMDL implementation plans. A TMDL lawsuit in North Carolina was dismissed in 1998, and Kentucky has not experienced any TMDL litigation. As a result, the pace of TMDL development has differed greatly for the states, with 1,595 produced in Georgia (some of which were by EPA), 149 in North Carolina, and 126 in Kentucky (EPA, 2010f). This variation echoes the wide range in TMDL production nationally, from 58 in Nevada to over 6600 in Pennsylvania. As was found in Georgia, high production of TMDLs is not necessarily any indication of progress in water quality improvements. At its worst, the TMDL production focus consumes significant agency resources to produce documents of limited utility and impact – resources that might have been otherwise used to directly support watershed improvement activities.

### **6.3 Reform Process and Outcomes**

The case studies in Chapter 5 examined how state agencies operationalized the watershed approach principles through specific management strategies and how these strategies evolved over time. Reform frameworks such as the watershed approach, ecosystem management, and adaptive management are often espoused in broad policy statements without sufficient attention to how the reform principles will be operationalized in agency practice (Imperial, 1999). Moving beyond rhetorical embrace of the reforms requires interpreting them in the specific context of an agency and somehow institutionalizing them, such as through changes to policy, organizational structure, staff roles, coordination mechanisms, or management processes. This section

begins with a summary of the concrete steps taken by states to operationalize watershed approach principles through the initial basin planning frameworks that were adopted. The remainder of the section reviews the reform outcomes of state watershed approach strategies in terms of progress in each of the dimensions of integrated, collaborative, adaptive, and results-oriented management.

In each of the cases, states worked with an outside consultant who facilitated a process of designing the framework among multiple agency programs. This helped to build collective agreement on the objectives and process elements of the framework among the parties involved. After North Carolina's adoption, the framework design process had increasing levels of interagency involvement in Georgia and the most elaborate interagency process in Kentucky, with many sub-committees that worked on different aspects of the framework. The watershed management frameworks were designed in such a way that they did not require structural reorganization or significant additional agency resources. Management process changes were implemented to realign the monitoring and assessment functions and NPDES permit reissuance around the rotating basin schedule.

The primary organizational change to implement the basin planning process was establishing new coordinator roles, which was handled differently in each state. In North Carolina, initially one basin planner was hired to coordinate with program staff and other agencies in compiling basin plan documents. This later expanded to a basin planning unit of 4-5 planners who each coordinated plan development for several basins. Two statewide coordinator positions for basin planning were established in Georgia, one in the water protection program and one in water resources. These positions worked closely with the consultant, who continued to assist with completing the basin plan documents through 2004, under EPA grant support. In Kentucky, there was one statewide watershed coordinator hired at DOW to lead the development and implementation of the state watershed framework. In addition, a total of six full-time and one part-time basin

coordinator positions were eventually hired at DOW or contracted with other agencies as each basin management unit came into the 5-year planning cycle.

The coordinator positions that were established at state or basin levels were critical in facilitating the interaction with internal programs and external agencies and stakeholders to make the basin plans come together. In North Carolina, basin planners coordinated directly on a one-on-one basis with program staff and other agencies to get the information and input needed to compile basin plans. In Georgia, the state coordinators facilitated a statewide basin planning team with representation from each water quality and quantity program and a few key partner agencies to coordinate the tasks involved in developing the basin plans. Kentucky's framework focused on ongoing interagency and stakeholder coordination in implementation of the watershed framework through a statewide steering committee and basin teams out in each management region.

In response to various internal and external factors, the states' implementation strategies evolved over time. In North Carolina, significant new watershed approach strategies were added in addition to basin planning, including nutrient management rules in several basins and watersheds in the state and the Use Restoration Waters program which worked with Region 4 and local stakeholder initiatives. In Georgia, the legislature replaced river basin planning with a new state water planning process that incorporated extensive stakeholder involvement and resulted in a new structure for integrated water quality and supply planning by regional councils. In Kentucky, in part due to many internal organizational changes and resource constraints, most of the formal framework elements have subsided but basin coordinators continue to support collaborative planning and implementation efforts in priority watersheds. The following sections discuss the management strategies used to implement the watershed approach in terms of each of the four reform dimensions, followed by a brief cross-reform discussion.

### Integrated Management

Perhaps the most long-running theme for reform in environmental governance is the problem of fragmented management and the need for integration. It has surfaced in

many contexts, such as arguments for cross-media management for air, land, and water which have historically been managed independently by EPA and states. Many have noted how the splintering of water management among different policies, programs and agencies has undermined sustainable water management (Adler, 1995; Feldman, 2007; NRC, 1999). The antidote often recommended is to shift towards an appropriate watershed or river basin scale of management, wherein interconnections can be addressed among water quality and quantity, surface and groundwater, point and nonpoint pollution, and the full range of land use impacts. Integrated management approaches share a common emphasis on applying a comprehensive scale and scope of management activities to better address these interconnections (Born & Sonzogni, 1995). Such integration is achieved through coordination mechanisms that bring together the agency programs and policy tools, interdisciplinary expertise, and stakeholders necessary to assess the problems and implement management solutions.

EPA's early watershed approach guidance reflected the principles of holistic watershed management encouraging a broad scope of integration including water quality, groundwater, wetlands, and habitat protection. EPA stayed within its jurisdictional authority over water quality and did not promote the integrated management of water quality and quantity in its guidance. A key early strategy EPA promoted to help institutionalize this holistic approach was to promote state basin planning frameworks similar to the one adopted by North Carolina. These state frameworks provided a mechanism to better coordinate existing CWA responsibilities and other water programs at the watershed scale. In the state cases, the rotating basin frameworks had the greatest impact on monitoring and NPDES permitting, though Georgia incorporated TMDLs and TMDL implementation plans through its consent decree. The management of other water programs was not typically affected by the basin planning schedule, except at times when the programs contributed information to basin plan documents.

Developing basin plans represented a new step for the state agencies, which previously did not have a mechanism for assessing and communicating information at a

watershed scale. The basin plans presented water quality assessment information but also synthesized – to different degrees in different states – information from several agencies on land use and population, groundwater, drinking water, water supply, permitted activities, and nonpoint source pollution program activities. Thus, basin plans constituted a fairly comprehensive assessment of available information on conditions in the basin and program activities relevant to watershed management. An audience of concerned citizens, stakeholders, and decision-makers, if willing to wade through and make sense of the voluminous amount of information, could utilize the publicly available basin plans as a starting point for taking action to address issues. While each of the states instituted an iterative cycle to develop basin plans, North Carolina was the only one that continued and is now entering the fourth cycle of plans. Georgia completed one full cycle of plans before changing to a new state water planning process, and Kentucky only developed one comprehensive basin plan before shifting their planning focus to smaller priority watersheds.

The chief limitation of basin planning as an integrated management strategy was that the plans generally did not go beyond information synthesis to drive action to address problems. By and large, different programs and agencies simply contributed information on what they were already doing or planning to do in the basin and these were compiled as the “plan.” There was not a collective effort across program managers and other agencies to identify strategic goals, forge coordinated action strategies to address specific problems, and track implementation. This hurdle of moving from assessment and planning to strategic implementation has been often mentioned in literature on integrated watershed management and is evident even in high-profile, well-funded efforts like the Chesapeake Bay program (Ernst, 2004). As Born and Sonzogni note (1995), integrated management requires a strategic, reductive process to hone in from the initial broad, comprehensive assessment to a more focused set of issues that organizations are willing to target collectively. Recognizing these limitations, states have since evolved into new or additional strategies to target integration on particular issues.

North Carolina has made the greatest strides in implementing integrated point and nonpoint source strategies to address nutrients at the basin scale. In the Neuse and Tar-Pamlico basins, rules were adopted to reduce nutrient loading from wastewater dischargers, agriculture, stormwater, and fertilizer applicators. In addition, basinwide rules to maintain riparian buffers have been instituted. Some regulated entities make offset payments to achieve their nutrient reductions offsite through a wetlands restoration program. Implementation of the rules has engaged a wide network of agencies and regulated entities in the collective task of reducing nutrient loading. The most intensive coordination among programs and agencies is in the development of nutrient rules for a particular watershed, after which each sector is responsible for its own implementation. The agriculture rules engender the most ongoing coordination, since they involve multiple organizations working together in committees to implement the rules. Beyond the nutrient rules, North Carolina has not had a particularly strong forum for coordinating strategic watershed management efforts among state organizations. However, building on the efforts of the Use Restoration Waters approach, DWQ is beginning to engage other agencies in dialogue about ways to strengthen communication and coordination on watershed restoration efforts.

The main emphasis for integration in Georgia has been better linking water quality and quantity management. Since 2001, many agencies, political leaders, technical experts, and stakeholder groups have contributed to the process of developing a new state water plan, which was adopted in 2008. The plan creates a new structure of regional water planning councils charged with developing long-term regional plans to meet water supply and wastewater needs through 2050. The plans are intended to guide EPD's permitting and infrastructure funding decisions, without superseding the agency's statutory authorities and duties to protect resources. EPD managers have been coordinating regularly with a core group of agencies on different aspects of the state water plan's implementation. Anticipating these changes on the horizon, in 2006 EPD merged its water quality and quantity programs into a new Watershed Protection Branch

to support more integrated water management. Five Assistant Branch Chief positions were later created to provide cross-program oversight at the basin scale. These positions sign off on all the wastewater, drinking water, and water withdrawal permits for a basin, giving the agency a better handle on how individual permitting decisions relate to upstream and downstream activities and interbasin transfers. The Assistant Branch Chiefs also facilitate cross-program coordination on particular issues in the basins.

Kentucky's watershed management framework was designed with a high emphasis on coordination mechanisms among agencies and stakeholders. A statewide steering committee with broad representation from agencies, universities, and stakeholder groups was convened twice a year to oversee the framework's implementation and enable information exchange on watershed-related initiatives. An interagency monitoring sub-committee played a critical role in coordinating monitoring efforts to achieve greater coverage and facilitate data sharing. Basin teams of agency and stakeholder representatives were convened on a quarterly basis to support watershed prioritization, planning, and implementation in each major basin. Basin coordinators were added at DOW or contracted to other agencies to provide critical leadership and facilitation in seven of the state's basin management units. The main focus of these coordination mechanisms has been to support stakeholder-based watershed action planning and implementation in priority watersheds. With organizational changes and resource challenges in recent years, DOW has not been convening the statewide and basin forums regularly. However, the agency has been pursuing greater internal cross-program integration through reorganization strategies and regular program coordination meetings on watershed issues. Aligning efforts to support local watershed planning and implementation among the TMDL, nonpoint source, and basin coordinator programs has been a focus of cross-program integration.

Despite these integration efforts, most of the work of the state agencies and EPA continues to be driven by individual program requirements with limited mechanisms for cross-program coordination on watershed issues. Statutory responsibilities which flow

through programmatic lines of funding and accountability tend to take precedence over more complex integration and coordination activities. Program silos are reinforced both by EPA's structure and program-based accountability systems and also by preferences of some program staff and managers to stay within the boundaries of their functional expertise. Adding watershed coordination roles to the organizational chart is an important step, but also can perpetuate the idea that "watersheds are *their* responsibility, not mine." Somehow, as Region 4 has attempted, agency leaders need to find ways to distribute accountability for strategic pursuit of watershed outcomes among the program managers and staff who each have tools to contribute.

#### Collaborative Management

There has been an increasing movement towards participation and collaboration in environmental management over the last two decades. Top-down policies implemented by federal and state agencies have drawn criticism for their limited ability to incorporate multiple public values and stakeholder interests. In many arenas, particularly in the western United States, debilitating conflict and gridlock around environmental management have spurred demand for more participatory and collaborative policy approaches. This has been particularly true with watershed stakeholder partnerships, which have sprung up around the country providing opportunities for local collaborative stewardship of resources. While these civic approaches are critical, particularly in addressing local nonpoint source pollution problems, they can benefit from being effectively linked to government agencies with resources, technical expertise, and regulatory authority to effect certain changes. Likewise, regulatory agencies will make limited progress in improving water quality conditions without interfacing effectively with local initiatives and stakeholders. This section reviews how state watershed approach strategies have enhanced participation mechanisms in agency decision making and fostered increased agency involvement in collaborative watershed management efforts.



The typical public participation methods used by state water quality agencies are the standard public notice, comment, and hearing requirements built into Clean Water Act programs. For example, state water quality standards, water quality reports (305[b] and 303[d]), TMDLs, and NPDES permits are released in draft form for public comment before being finalized by the agency or sent to EPA for approval. Citizen lawsuits have also been used by environmental groups, as in the wave of TMDL cases in the 1990s, to try to secure agency actions by EPA and states that are more protective of water quality, fueling an adversarial climate surrounding regulatory agencies. Prior to the watershed approach strategies reviewed in the case studies, there was little precedence in the states for more substantive participatory mechanisms in agency decision making. While this section discusses some steps the states have taken to enhance participation, it should be noted that most of the regulatory programs continue to routinely use standard public notice, comment, and hearing processes. These standard participation mechanisms have been critiqued on several accounts, such as the lack of substantive stakeholder input throughout policy development and the need for more constructive forums for stakeholder deliberation surrounding areas of conflict.

The basin planning frameworks of North Carolina and Georgia incorporated public workshops to present basin assessment information and gather input on priority concerns and management strategies for the basin plans. This expanded opportunities for participation beyond the formal public hearing and comment period on the draft plans. The workshops provided a non-regulatory forum for the agency to share the integrated assessment of conditions, trends, and management activities in the basin and for public participants to discuss and give input on issues. According to Fung (2006), participation mechanisms vary along a spectrum in terms of degree of inclusiveness, intensity of communication and decision processes, and extent of power and authority over decision outcomes. The public workshops hosted in conjunction with basin planning were inclusive in the sense that they were open to any who wanted to participate. However, the forums were limited in terms of active deliberation and problem-solving by

participants. They had limited substantive influence on agency decision because the basin plans themselves were an inventory of conditions, activities, and recommendations, not a set of new strategic action strategies that citizens might help shape and empower.

In North Carolina, the agency has experimented with more intensive, structured stakeholder processes in the rounds of nutrient rulemaking that have occurred in other watersheds since the adoption of the Neuse rules. One significant hurdle has been that rules developed through the stakeholder consensus process can be reversed or revised if objections are raised later by other parties in the formal public hearing process. This happened in the controversial Jordan Lake rules, with objection letters causing the rules to be elevated to and revised by the General Assembly. Such an outcome makes the investment in early stakeholder engagement and consensus building can seem like a fruitless exercise. In other processes, like the recent rulemaking for Falls Lake, the state mandated timeline is short enough to only allow for a more abbreviated stakeholder process. In the face of these challenges, some managers conceded that are still trying to clarify for themselves and for stakeholders to what extent they can incorporate stakeholder input into these complex regulatory decisions. Each new rulemaking effort has been an experimental learning process.

These experiences reflect some of the benefits and costs of public participation summarized by Irvin and Stansbury (2004). Potential benefits include education – as citizens and agency staff learn from and inform each other – and opportunities to break through gridlock, avoid costly litigation, gain public trust and legitimacy of decisions, and offer citizens greater control in the policy process. However, there are a number of potential disadvantages to citizens and agencies as well. Public participation mechanisms can be costly and time-consuming, using resources that could be used for actual implementation of policy solutions. Participation may engender disenchantment or hostility towards the agency when various citizen or stakeholder preferences are not incorporated into the agency's decisions. Regulatory agencies have a particularly challenging task to incorporate stakeholder input, because it is difficult to satisfy

conflicting stakeholder demands and statutory obligations. Creating policies to better protect environmental resources typically involves opposition from regulated entities who will face new requirements and costs. Agencies must aim to stay within the bounds of legal authority, scientific justification, and technical and political feasibility, which can result in policies that environmental organizations view as not sufficiently protective of environmental values. These benefits and challenges have been evident to varying degrees in North Carolina's nutrient rulemaking processes.

In Georgia, there is a relatively high degree of conflict among environmental interests and various resource users in different regions regarding what water quantity and quality management strategies should be used. Interstate water issues have been highly litigious and two decades of negotiation and efforts to reach agreement on a water allocation formula among states have not yet been successful. The new state water plan, with its regional water planning structure, aims to more constructively manage these conflicts by moving beyond the typical crisis-triggered, reactive mode of agency decision making. An intensive stakeholder process was used by EPD to develop the state water plan, drawing on input from a statewide stakeholder advisory committee, basin advisory committees, and technical advisory committees. The resulting state water plan attempts to move beyond agency-driven water management, empowering regional leaders to devise sustainable, flexible solutions to meet long-term water demands within the constraints of resource capacities. The agency will have to navigate new roles in working with the regional councils to make sure that the plans are adequate to protect resources and then use the plans as a guide for permitting and infrastructure funding decisions. It remains to be seen how the agency will balance such a stakeholder-based planning process with its regulatory decision processes.

In Kentucky, the emphasis has been less on participation mechanisms in agency decision making and more on engaging citizens and stakeholders in collaborative watershed management efforts. The agency's basin coordinators, located in regional offices around the state, were charged with facilitating watershed planning and

implementation efforts in priority watersheds. Some of the basin coordinators held initial public meetings to generate involvement of community members in the watershed framework, but on the whole it was a struggle to generate much interest and commitment through these open forums. Supporting the volunteer monitoring efforts of the Watershed Watch groups in each basin has been a more effective nexus between the agency and citizen efforts, though there are still tensions surrounding the agency's limited use of volunteer data. The basin coordinators have helped to nurture the momentum of watershed planning and implementation efforts by working directly with stakeholder groups and agencies and helping to connect the dots between various initiatives and resources. These efforts have been most successful in watersheds where there were already stakeholders mobilized to some degree to work on watershed problems. In many cases, though, the agency learned the frustrating lesson that it rarely works to go into an area that agencies pick as a priority based on environmental problems and make collaborative watershed management happen. Some degree of local interest and commitment is a prerequisite.

Koontz et al. (2004) used a series of case studies to explore the varying roles that government plays in collaborative environmental management. The cases showed that government influences collaboration through its institutions (e.g. policies, rules, funding mechanisms) and also through its actors (the staff who interface with collaborative efforts). Regulatory policies can provide the necessary driver or "stick" to prompt stakeholders to work with agencies on more collaboratively generated solutions, as TMDLs and the Endangered Species Act have facilitated in some places. Government funding programs, like federal cost-share programs for nonpoint source pollution control, also provide important incentives and supports for stakeholder-based watershed planning and implementation. Agencies may decide to play a leading or facilitating role in collaborative efforts, or to follow and support initiatives led by citizen or nongovernmental entities. There is potential for agencies to have a negative influence by

exerting too much control over collaborative management processes or, conversely, by not engaging and assisting enough with local efforts.

Regulatory agencies may be more likely to fall in the “not enough influence” than the “too much influence” category, since they have historically devoted minimal resources devoted to collaborative roles. The agencies covered in this study are by and large staying within the boundaries of their regulatory roles, but are increasingly taking exploratory steps into more collaborative roles. Kentucky has been at it the longest with the basin coordinator positions and coordination forums at the state and basin level. However, resource constraints and lack of strong policy drivers and funding incentives have limited implementation progress in watersheds. North Carolina’s Use Restoration Waters program is a promising partnership between the state and Region 4’s watershed approach which is providing a channel for the agency to support collaborative initiatives. The program has done a good job of conceptually developing the roles of local watershed champions and various agency partners in a results-oriented, collaborative restoration process.

State water quality agencies face the opportunity and challenge to provide effective bridges between the top-down policy structure of environmental regulation and the bottom-up watershed efforts of communities. Thomas (1999) found that agencies which are more centralized and top-down (e.g. the Forest Service) had a more difficult time interfacing effectively with watershed partnerships than agencies which were more decentralized in local communities (e.g. Bureau of Land Management). Perhaps a good corollary in eastern states would be the difference between state water quality agencies and local soil and water conservation districts. It can be more difficult for regulatory agencies to be trusted in collaborative roles among those who think regulations are too strict or not protective enough. However, there is a need for an effective blending of regulatory tools and voluntary civic approaches, as was concluded in a recent thorough evaluation of the Chesapeake Bay program; neither is likely to be sufficient on its own (NAPA, 2007). For this reason alone, the steps taken by state water quality agencies to

enhance substantive participation and step into new collaborative roles are of critical interest.

### Adaptive Management

Adaptive management, particularly as it is portrayed in the reform literature, has not been a major focus in state and EPA watershed approach strategies. In the field of environmental management, there has been considerable fuzziness and multiple interpretations concerning what adaptive management means and entails. Therefore, before discussing the study findings, some key background and principles of adaptive management from the reform literature are reviewed.

Adaptive management gained recognition among natural resource agencies as part of large ecosystem management efforts in the 1990s, such as those in the Columbia River basin, the Florida Everglades, and the Northwest Forest Plan to balance endangered species protection with timber management activities (Gunderson & Light, 2006; Lee, 1993; Stankey et al., 2003). The basic rationale for adaptive management is that ecological systems are complex, dynamic, and respond to human- or naturally-induced changes in an unpredictable manner. Traditional control-oriented strategies used by agencies, such as highly engineered hydrological management regimes, have in some cases undermined ecological resilience and led to unintended consequences. For this reason, adaptive management theorists argue for a structured, experimental approach which generates learning about systems and readily adapts to new knowledge, conditions, and social objectives. Adaptive management concepts have been adopted and developed, at least in principle, by federal natural resource agencies such as the Forest Service and Army Corps of Engineers, which play a very direct role in managing public lands and river systems (NRC, 2004; Stankey et al., 2005).

The principles and techniques of adaptive management were developed by systems ecologists Holling (1978), Walters (1986), and other colleagues who have been directly engaged in large-scale adaptive ecosystem management efforts (Gunderson et al., 1995). These theorists discuss several mechanisms by which learning occurs in

environmental management. Typically, they suggest, learning happens in a fairly random process through trial-and-error, or “evolutionary learning” (Walters & Holling, 1990). This type of learning is often slow and unreliable in producing valid scientific and technical knowledge. Adaptive management aims to improve on trial-and-error learning by structuring management processes more like scientific experiments. Available ecological and socioeconomic data are used to generate a model of how the system functions and how it might respond to various management alternatives. In *active adaptive management*, the method favored by the concept’s originators, these management alternatives are implemented as carefully designed and monitored experiments to test hypotheses. Because of the high costs, perceived risks, and agency and stakeholder resistance associated with such large-scale ecosystem experiments, active adaptive management has been quite rare in practice (Walters, 1997).

Agencies which have taken steps in this reform direction have favored *passive adaptive management*, probably because it presents less of a radical departure from traditional agency decision making processes. In such an approach, an assessment and model of the system is developed, management alternatives are evaluated, and a single optimal management strategy is selected to be implemented. Implementation is monitored and the model and management strategies are adjusted based on what is learned, in an iterative process. The National Research Council (2004) identified six features of adaptive management common to both active and passive management approaches:

1. Management principles that are regularly revisited and accordingly revised
2. A model(s) of the system being managed
3. A range of management choices
4. Monitoring and evaluation of outcomes
5. A mechanism(s) for incorporating learning into future decisions
6. A collaborative structure for stakeholder participation and learning

There were very few references to adaptive management in EPA’s early watershed approach documents and in state documents. On paper, however, the adaptive

management cycle looks quite similar to the iterative basin planning frameworks that were implemented in the state case studies and promoted in EPA guidance. In ideal form, the basin planning cycle starts with monitoring and assessment of water quality conditions. From the data, modeling would be used to develop limits for NPDES permits and TMDL strategies to address point and nonpoint source loadings. Basin plans would be developed with input from many agencies and stakeholders to identify watershed goals and management strategies. Then, management strategies would be implemented and the next cycle of monitoring and assessment would be used to evaluate and adjust management strategies as needed. At the least, the rotating basin cycle did set up a mechanism by which some degree of adaptive management could occur, improving on the otherwise piecemeal programmatic actions of agencies. However, the adaptive management potential was constrained and not fully realized for a variety of reasons.

The most critical limitation was that basin plans did not identify clear management strategies that were implemented and monitored for effectiveness. Without implementation, there is little opportunity for the “learning by doing” that is the hallmark of adaptive management. Agencies could have fostered implementation, at least internally, by generating specific commitments from each program to address particular problems in the basin and tracking implementation and outcomes of these strategies. This was attempted to some extent in North Carolina, but the basin planners were often so busy generating new basin plans that they had little time to interface with programs on ongoing implementation. Recently, the agency has been exploring ways to streamline the basin plan production process so that planners can spend more time working with programs and stakeholders on implementation strategies.

From the three cases, North Carolina’s nutrient strategies demonstrate the most connection with adaptive management principles and challenges. It has been argued that adaptive management is appropriate for contexts where there is a clear, agreed upon management goal, but there is uncertainty surrounding the best means to achieve the goal (Lee, 1999). In the nutrient rulemaking processes, a clear nutrient reduction goal is set



(e.g. reduce nitrogen loading from point and nonpoint sources by 30%) and rules are developed to achieve the goal. Modeling is conducted to determine how various point and nonpoint sources are contributing to the loading and to evaluate potential policy strategies for reaching the reduction goals from the contributing sources. In recent rulemaking processes, the agency has employed some level of stakeholder involvement to develop nutrient reduction strategies in the rules that will be most feasible for regulated entities to implement. After the Neuse rules had been fully implemented for three years, monitoring data revealed no reductions in nutrient loading in the estuary. The agency did some initial assessment of the Neuse rules among program staff to generate the “action plan” elements of the basin plan, which some stakeholders had demanded. However, the agency is still wrestling with how to revise nutrient strategies on an ongoing basis in the face of policy uncertainties and resource limitations.

In Georgia, based on the way the TMDL consent decree was negotiated, the basin planning schedule more tightly linked monitoring and assessment, TMDL development, NPDES permitting, and TMDL implementation plans. However, implementation was still weak because most TMDLs were for nonpoint sources, with voluntary implementation plans that were rarely implemented by local entities. Moreover, managers in Georgia conceded that the basin plans were not really used by program managers to guide program priorities. EPD managers see the new regional water planning structure as more conducive to adaptive management in the long-term, though adaptive management is not a term used in the state water plan. The resource assessments for water quality, water quantity, and groundwater, in conjunction with the new water demand forecasts for multiple sectors, will provide a more robust and consistent information base for developing management strategies. The regional water councils will be required to identify specific water management practices to meet water and wastewater needs, which, once approved by the agencies, will be linked to permits and infrastructure funding decisions. Thus, there should be more explicit mechanisms for implementation than the prior basin planning process. The state and regional water plans are to be reviewed and

modified every 5 years to reflect updated resource assessments. The managers interviewed noted that more specific evaluation benchmarks and mechanisms for adapting management strategies will need to be developed as implementation proceeds.

There has not been as much conceptual development of adaptive management principles and operational strategies at EPA as there has been in guidance reports for other natural resource agencies such as the U.S. Forest Service and U.S. Army Corps of Engineers (NRC, 2004; Stankey et al., 2005). This may be partly due to the fact that the more sophisticated active adaptive management techniques, involving ecosystem-scale management experiments, are difficult to apply to the routine regulatory responsibilities of EPA and states. Based on reviewing agency documents, EPA has adopted a fairly simple passive adaptive management interpretation, without using the term “passive.” The EPA and state managers interviewed interpreted the term in a variety of ways within the spectrum from trial-and-error to passive adaptive management, with no evidence of an active adaptive management interpretation employed. Most saw it as a phased and iterative process of planning, implementation, monitoring and adjusting. Some saw it as a buzzword that just describes what agency managers already do: adapting and changing strategies to make program activities work better. Some scholars have argued that such oversimplified interpretations undermine the true transformative potential of structured, deliberate adaptive management experiments that accelerate learning, evaluation, and adaptation (Allan & Curtis, 2003). In the state cases, there was a need observed for more time and space in which managers can critically evaluate the effectiveness of watershed approach strategies and make the changes needed to try to improve policies and practices over time.

### Results-Oriented Management

The evolution of the watershed approach at EPA has coincided with the rise of performance-based management reforms for government, particularly at the federal level. With the reinventing government movement that took shape in the 1990s and the Clinton administration’s National Performance Review, reform attention focused on the need for

EPA to move beyond prescriptive, procedure-focused regulation to use more flexible, cost-effective strategies for achieving environmental outcomes. The Government Performance Results Act of 1993 brought all federal agencies, including EPA, into a cycle of strategic planning every five years, developing program performance measures, and tracking progress in bi-annual reports. Although EPA experimented with results-oriented innovations such as the National Environmental Performance Partnership System with states, these faced many challenges in implementation (NAPA, 2000; Scheberle, 2004). The difficulties of incorporating performance accountability into a strongly program output-focused agency and a shared-power environmental federalism context have been noted (Gormley, 2000; Paddock & Keiner, 2000).

Within this context, EPA's guidance has always presented the watershed approach as a way to more efficiently and effectively achieve environmental results through strategies that "get more bang for the buck." One strategy promoted in EPA guidance is using a priority watersheds focus to target collective resources in particular areas. In the early 1990s, EPA advocated a more broadly defined risk-based approach to targeting watersheds, but this narrowed with the heightened TMDL focus to prioritizing based on listed impaired waters. Since 2005, EPA has been developing stronger strategic planning, performance measures, and tracking mechanisms which include a few new key water quality and watershed outcome targets. The emphasis on achieving measurable water quality improvements has mostly been pursued through the nonpoint source program, under pressure from Congress and the Office of Management and Budget to show some results from the funding that is distributed to the states. Finally, EPA has promoted market-oriented strategies such as water quality trading as a more flexible, cost-effective tool for achieving collective point and/or nonpoint source pollutant loading reductions.

Of the three states studied, Kentucky was the only one whose basin planning framework emphasized targeting priority watersheds. This was likely shaped by the fact that it was adopted later than the other states, in 1997, when the Clean Water Action Plan

was emphasizing a priority watersheds approach to restoring impaired waters. Kentucky's framework was designed so that basin coordinators and teams would use monitoring and assessment data to select priority watersheds (HUC-11 scale) to pursue watershed action planning and implementation. An elaborate data-driven prioritization formula was used to rank watersheds based on protection and restoration criteria, and basin teams were to combine this with other local feasibility considerations to select 3 priority watersheds. In practice, the agency struggled in many of the priority watersheds because there was not sufficient stakeholder interest to work on watershed planning and implementation. A key lesson learned was that local interest and commitment is the critical prerequisite for prioritizing and that agency efforts to go into an area prioritized based on environmental data and "make something happen" generally are not effective.

Since 2004, Region 4 has oriented its watershed approach reform efforts around pursuit of EPA's new strategic targets for water quality and watershed outcomes (measures SP-10, 11, 12). The strategic target SP-12 is the only one of EPA's litany of performance measures that aims to capture water quality improvement on a watershed basis through using a watershed approach. Region 4 has made, and so far met, commitments to achieve roughly one SP-12 watershed improvement per state per year, a higher collective target than many of the other EPA regions have committed to meet. Region 4's state watershed coordinators pursue these measurable watershed improvements by working with states to select priority watersheds and supporting watershed assessment, planning, implementation, and outcome monitoring in these areas. Priority watersheds are selected mostly based on their potential for achieving measurable improvements, with criteria such as clusters of listed impaired waters, active stakeholder groups with the commitment and capacity to implement restoration activities, and prior agency investments in restoration actions that may be starting to yield measurable results.

Although Region 4 aims to assist and track efforts in priority watersheds, the lion's share of the watershed restoration work is done by local and state entities. In North Carolina, the Use Restoration Waters program has been a very effective partnership to

develop DWQ's role in collaborative watershed restoration efforts in alignment with elements of Region 4's priority watersheds focus. The program has had a clearer structure and impact through the state and EPA working together on mutual goals. Kentucky's existing work on watershed planning and implementation in priority watersheds has also supported Region 4 in its goals. In some other states in the region, there has been less of an effective connection between the priorities that states are focused on – for example, state water planning in Georgia – and Region 4's emphasis on measurable improvements in small priority watersheds. EPA managers have heard from some states that it is politically challenging for them to designate priority watershed, since this indicates that some areas are getting more attention and resources than others. There is a valid equity argument for spreading the resources around rather than concentrating them in a few places in order to delist a few impaired streams.

North Carolina's nutrient management strategies are probably the best example from the cases of a results-oriented strategy that uses a suite of policy tools, including point source trading and nonpoint source offsets, to meet a watershed scale pollution reduction target. The state's nutrient strategies started with point sources, applying stricter permit limits to reduce nutrient loadings from wastewater dischargers. At the initiative of dischargers seeking to minimize the cost of required reductions, cap-and-trade mechanisms in the Tar-Pamlico, Neuse, and other watersheds have given dischargers flexibility to achieve significant nutrient load reductions at a much lower aggregate cost. The state legislature's mandate of a 30% nitrogen reduction from point and nonpoint sources in the Neuse basin spurred a new suite of nonpoint source rules covering agriculture, stormwater, fertilizer application, and riparian buffers. The rules are designed based on modeling and accounting tools to achieve the clear outcome target that had been set. Despite these advances, measurable progress in achieving the desired load reductions in downstream in the Neuse estuary has been minimal so far, indicating the significant complexity and long-term challenge of achieving watershed results.

While the strategies discussed have taken steps in the direction of results-oriented management, there are a number of significant obstacles facing these reforms. The staff time devoted to targeting watershed improvements, both at Region 4 and states, is limited to a handful of positions at best, while the rest of the agencies' resources continue to be driven by program output requirements. Pursuing watershed improvements is difficult when there are limited regulatory drivers and funding mechanisms to incentivize local stakeholders to take action on nonpoint source pollution problems. Trading schemes may be a promising tool in certain contexts with the right confluence of environmental and policy criteria, but they must be carefully designed and managed to make sure nonpoint source load reductions are sufficiently achieved (EPA 2004, 2007b). Ultimately, making progress in reducing nonpoint source pollution and achieving measurable water quality improvements is often a long-term, incremental process. While the emphasis on measurable results can help bring strategic focus and enhanced monitoring to local watershed efforts, unrealistic expectations for short-term improvements should not overshadow the reality that these are complex, long-term, expensive problems to fix. A broader set of intermediate measures and indicators of watershed progress, including critical social dimensions such as public education, partnership building, and policy development, are needed to supplement the more long-term water quality improvement measures (Born & Genskow, 2000).

#### Cross-Reform Discussion

EPA's definition of the watershed approach has evolved over the years to encompass basic principles of integrated, collaborative, adaptive, and results-oriented management at the watershed scale. The interpretation and application of these principles by EPA and states has, predictably, been more narrow and constrained than the ideals presented in environmental governance reform literature. As discussed earlier in Chapter 2, ideal reform frameworks like the watershed approach and ecosystem management call for change in multiple dimensions at once, with each dimension requiring significant challenges in going against the grain of traditional agency policies,

structures, and norms. In practice, it is likely that agencies will focus on some strategies more than others and that these choices will be shaped by each agency's unique context, responsibilities and priorities, and culture. One question raised in Chapter 2 is *how do these reform dimensions interact with each other?*

Integrated and collaborative management are generally mutually supportive, because in most cases taking a holistic perspective on watershed issues requires bringing together diverse stakeholders, resources, and expertise in a collaborative forum. However, integrated watershed management strategies adopted by agencies may fall on a spectrum from more agency-centric (top-down) to more community/stakeholder-centric (bottom-up). The integrated management strategies adopted through basin planning frameworks tended to be more agency-centric with limited ties to stakeholder collaboration. The frameworks were useful in getting some agency program activities more watershed-oriented and forging greater information sharing and some coordination across agencies on watershed conditions and management strategies. But the frameworks did not focus on building stronger collaborative ties to local stakeholders who would have to implement policies and practices to improve watershed conditions. The exception was Kentucky which was designed later with an emphasis on stakeholder engagement in priority watersheds. Thus, through basin planning, reform was pursued more in the integrated dimension than in the collaborative dimension, which is not surprising given the tendency for regulatory agencies to face challenges in taking on collaborative roles (NAPA, 2007)

The increased focus at EPA and in states on achieving water quality results in impaired waters has to some degree enhanced progress in collaborative management. In order to pursue water quality improvements, Region 4 and some states have selected priority watersheds in which to support collaborative stakeholder efforts in local watershed planning and implementation. For example, through basin coordinator roles in Kentucky and the Use Restoration Waters efforts in North Carolina, the agencies are playing more of a support or facilitation role in providing coordination, technical

assistance, and access to funding options to stakeholder initiatives. However, the focus on measurable water quality improvements in impaired waters can also narrow the scope and scale of watershed problem-solving in counterproductive ways. The emphasis of planning and implementation – at least to receive nonpoint source funding – shifts from looking at a broad range of watershed problems and community concerns to trying to delist a particular impaired stream, which can be very resource intensive. Thus results-oriented management reforms can bring a strategic focus but if too narrowly applied can hinder more holistic, integrated management that encompasses watershed protection, restoration, and other community goals.

In the theoretical literature, there is a wide gap between the principles of adaptive management and results-oriented management. Both feature an iterative cycle of planning, implementation, monitoring, evaluation, and adjustment. However, adaptive management starts from the premise that ecological systems are complex, dynamic, and uncertain. In the face of such uncertainty, the emphasis is on experimentation and learning, with unanticipated consequences and “mistakes” to be expected; there is not a driving force towards meeting predictable outcomes. Results-oriented management assumes that if you set an outcome target and align resources to meet it, you will meet it. If you do not meet the target, there is an implication that performance is lacking. As has been discussed, a focus on narrow outcome targets tends to simplify strategic decision making while failing to embrace the true complexity of ecosystem problems and sustainability tensions. As Allan & Curtis point out (2005), the bureaucratic imperatives inherent in natural resource agencies to keep moving towards achieving program targets inhibit a culture of self-evaluation and reflexivity that are required to effectively learn from experience and adjust strategies as needed.

Interestingly, the EPA and state interpretations of adaptive management observed in this study indicate a somewhat pragmatic blending of the two reforms. For example, EPA’s strategic plan uses the term “adaptive management” to describe its performance management approach to better track program outcomes and adjust strategies as needed



to make greater progress in the outcomes. It is difficult to conceptualize how the pure form of active adaptive management through large-scale ecosystem experiments, as advocated in the theoretical literature, can be applied to the everyday work of regulatory agencies. Perhaps this is why managers have interpreted adaptive management in a simple way that makes sense to them: you assess, model, and develop a plan to achieve pollution reduction goals; you implement the plan's strategies and monitor the outcomes; then you use what you learned from the successes and failures to design your next set of strategies. The connection between results-oriented and adaptive management was vividly demonstrated in North Carolina's nutrient strategies: the legislature said adopt rules for a 30% nitrogen reduction and in 5 years the problem will be fixed. When the problems were not fixed in 5 years, then the adaptive management challenge set in. This drives home the critical concern of adaptive management reforms: do agencies have the time, resources, support, and will to evaluate these outcomes, look critically at what needs to be done differently, and make the changes that are necessary. The answer at this point appears to be *no*, and any idealistic push to achieve measurable water quality results will have to contend with this challenge.

One last tension among the reform dimensions that demands attention is the counterproductive effect of how performance-based management reforms are implemented at EPA. While there have been limited improvements at EPA in incorporating some strategic outcome measures that better capture progress in environmental goals, the much easier to measure and manage program output measures are still driving the game. Particularly in the face of budget cuts at state agencies, priority will go to the core regulatory responsibilities that states report to EPA as part of their federal funding: how many permits did you issue on time, how many TMDLs did you develop on schedule, how many compliance inspections did you conduct. While routine regulatory duties are important, it is the more targeted, cross-program efforts in conjunction with other agencies and stakeholders that hold greatest potential for addressing the country's leading nonpoint source pollution problems. Yet insufficient

staff time and resources go to these types of activities which transcend the program output channels that still make up the bulk of EPA's accountability structure. Thus, an overriding emphasis on program performance, as measured by EPA, can detract from efforts states might pursue in the direction of more integrated, collaborative, and adaptive management.

## **6.4 Conclusions & Recommendations**

As has been widely noted, environmental governance reform to better address the complex, cross-jurisdictional sustainability problems of the 21<sup>st</sup> century is significantly constrained by an array of institutional challenges. Durant et al. (2004) observed the "Herculean task that reformers face in challenging a highly bureaucratized, inflexible, and hyperfragmented [environmental] governance regime" (p. 6). Yet agencies *are* adapting – sometimes fairly readily, many times painfully slowly – to the changing demands of environmental management. Changes are fueled in part by external drivers of problems, policy action, and public concern, but also by agency managers applying their expertise and commitment to better address problems with the tools and resources at their disposal. There has been experimentation and some progress, as well as learning from well-intentioned attempts that yielded less than ideal results.

The reform literature is rife with excellent ideal principles which are important as visionary beacons, yet must be translated and adapted to specific real-world contexts in order to be useful in practice. Fragmented bureaucracies are indeed part of the problem, but since they do much of the everyday work of environmental management, attention should focus on how they are contributing, or can contribute, to innovative solutions. The incremental steps to get from the limitations of current realities to the sought-after reform practices need to be mapped and pursued. It is difficult to do this visioning and strategic mapping when more immediate responsibilities and crises demand attention. Nonetheless, there is a need for agency leaders and managers to create spaces where reform principles and strategies can be revitalized and adapted on an ongoing basis with the lessons from experience.

Engaging with managers at states and EPA who are immersed in watershed reforms was a stimulating, illuminating, and humbling experience. I was impressed by the technical, administrative, and social complexity which managers regularly confront. I felt empathy for coordinators who have taken logical steps to champion watershed reforms which, for varying reasons, have resulted in some disappointing outcomes. Such hard lessons can take the wind out of one's reform sails. All the same, I was struck by how much a small handful of managers dedicated to watershed coordination roles can accomplish, and what more might be achieved if additional agency resources were devoted to such work. I am immensely grateful for the opportunity to learn vicarious lessons in watershed reform from the hard-working and skillful managers who allowed me a window into their worlds.

#### Study Limitations and Suggestions for Further Research

In concluding this dissertation, it is important to revisit the limitations of this study's scope and the need for further research to address other important issues and perspectives. This study focused on the perspectives of select agency managers who have been most involved in watershed approach strategies. The intent was to learn from their experiences about the process and progress of trying to implement reform practices within institutional constraints. In adopting this scope, there were many other important perspectives that were not captured and would provide an interesting counterpoint to this study. For example, environmental advocacy groups that are focused on the limitations of regulatory agency programs would likely have a much more critical interpretation of agency watershed approach reforms. The various agencies and stakeholder groups that have participated in watershed coordination forums at state, basin, and local watershed levels would have an important range of perspectives to contribute on the reform efforts led by state water agencies. Even within the state water agencies, it would be useful to see how watershed approach strategies are perceived by program staff and managers who have less of a direct role in them. This might help to gauge the level of openness and

interest among technical program staff, which make up the bulk of the agency, to engage in more integrated, collaborative, adaptive, and results-oriented strategies.

One important aspect of the federal and state policy context for watershed reforms which was not addressed in this study is the role of interest groups and nongovernmental organizations. Interest groups, particularly at the national level, play a significant role in pushing for water policy goals which may or may not be aligned with collaborative watershed governance reforms. Regarding regulatory actions, governmental agencies often fall somewhere in the middle ground between environmental organizations that seek more stringent regulatory policies and enforcement and economic interest groups that seek to limit the scope and cost of regulations. A highly adversarial climate of frequent litigation and political gridlock become common for EPA and national environmental policies. In this climate, efforts to incorporate watershed management principles into the Clean Water Act through reauthorization have been unsuccessful in gaining traction. Reform arguments which emphasize collaboration, flexibility in regulatory tools, and market-based strategies are not embraced by some environmental interest groups that favor stronger implementation and enforcement of existing laws and regulations. In contrast, some environmental organizations such as The Nature Conservancy and local watershed associations play critical roles in initiating and facilitating collaborative watershed governance initiatives that bridge agencies, stakeholder groups, and citizens. Exploring the roles of various types of interest groups at national, state, and local levels was beyond the scope of this dissertation but merits significant further attention in future research.

This study focused on three states in a similar regional and institutional context but with some variation in state contexts and watershed approach strategies. There are many other state models from which to learn about watershed approach reforms (Born & Genskow, 1999). Some states, like Washington and Oregon, have used a more bottom-up model separate from the water quality agency, which grants funding for restoration activities by local watershed stakeholder councils. Florida and California have much

more complex regional water management structures which operate very differently from the centralized water quality agencies found in most states. In Ohio, multiple agencies have contributed resources to a grant program that helps fund over 40 watershed coordinator positions in local governments or nonprofit organizations. These are just a few examples of other state watershed approach models which could be targeted in future research to illustrate the successes and challenges of various reform strategies. Since financial resources can be such a critical limitation for watershed work, an in-depth study of various state watershed funding mechanisms would be a valuable resource to assist other states in developing resources beyond the traditional federal funding sources.

This study took a broad, holistic view of the key watershed approach strategies employed by three states over nearly two decades. This scope enabled examining multiple strategies and their evolution over time, captured in broad strokes but not in rich, intimate detail. The research was humbling in the recognition that I was only able to scratch the surface, in many cases, of very complex, interesting, and important reform processes. Some of the dynamic technical and social policy challenges within North Carolina's nutrient management strategies, Georgia's state water planning, and Kentucky's interagency coordination forums would yield a wealth of reform process insight through further in-depth study.

### Conclusions and Recommendations

Of the many interesting issues and questions for further investigation that emerged from this research, three main themes should be underscored for their relevance to the policy domain of watershed governance and their resonance with prior scholarship.

First, *the unique political context in each setting plays a critical role in shaping the opportunities for and constraints upon effective watershed governance*. Agency reform efforts will likely be limited in scope and impact if they are not tied to an effective political process that empowers new policy strategies while addressing stakeholder concerns and conflicts. The basin planning frameworks embraced by state agencies in the cases did not attempt to move beyond assessment of problems and recommendation of

policy solutions to engage in a collective watershed governance process. Schlager and Blomquist (2008) note that while the reform literature often depicts politics as the confounding barrier to sustainable watershed management, the political process is precisely the vehicle through which watershed governance must occur:

For people to govern watersheds well requires that they make collective choices. People, organizations, interest groups, and governments, all of whom represent different interests, values, dreams, and aspirations, must collectively decide how to govern the shared resources and uses of watersheds. Collective choices are ultimately political choices. Thus, governing watersheds well requires embracing politics. (p. x)

The more robust agency reform strategies evident in the cases have been propelled in the political arena by a sense of crisis surrounding particular environmental problems that prompts heightened public and stakeholder engagement in the policy process. There has to be sufficient public interest and demand for change in order for agency policies and management strategies to deviate substantively from the status quo. For example, in North Carolina, public and political concern regarding nutrient loading to estuaries has spiked during periodic episodes of algal blooms and fish kills, leading to policy action by the state legislature. Regulated wastewater dischargers facing higher compliance costs from state nutrient regulations have been highly engaged with the policy process, pushing for flexible, cost-effective cap-and-trade options and demanding that agriculture and other nonpoint sources share in the burden of reducing nutrient loads. For Georgia, a sense of crisis surrounding droughts and water use conflicts within the state and among neighboring states has spurred significant political engagement in the state water planning process. In contrast, Kentucky has not had a sufficiently salient water-related problem or crisis to engage public, stakeholder, and political interest and therefore give momentum to watershed policy action.

While a broader political process is needed beyond agency-based efforts, the political climate that often surrounds state agencies does not seem to be generally

conducive to reform. Some reflections from Ernst's in-depth study of the collaborative Chesapeake Bay initiative and its limited progress over two decades bear mentioning:

The problem with enacting sound environmental public policy is not that it is unattainable from a technological or resource perspective; it is that the normal policy climate is generally hostile to the types of environmentally sound public policies that are necessary to restore a complex ecosystem like the Chesapeake Bay. The environmental policies that tend to emerge from this political climate tend to be reactionary, voluntary, and generally insufficient to meet the considerable challenges (2004, p. 21).

A second concluding theme from the research is that *federal and state agencies play a key role in influencing this political context through the rules and incentives they create*. The sense of crisis that brings stakeholders to the table springs not merely from direct environmental problems but from the potential costs and impacts of environmental regulations to address the problems. Without the looming prospect of the “stick” of strong regulatory tools and/or heightened compliance costs, there is little incentive for point and nonpoint source interests to engage in a collective watershed governance process. The full suite of policy tools, including innovative regulations and funding mechanisms, should be applied strategically by EPA and states to incentivize watershed protection and restoration actions. North Carolina has taken strides in this area through its nutrient policies and other substantial state watershed funding mechanisms. In recent years, Georgia has invested significant resources in a new state water planning process, which will require sustained investment and political support in order for its implementation to yield more sustainable water resource outcomes. In Kentucky, there have been limited regulatory or funding incentives to incentivize watershed collaboration, with the exception of recent EPA consent orders to address combined sewer overflows in the two regional sanitation districts.

Other prominent cases of watershed governance in the United States also echo the need for adequate policy incentives to transform watershed management practices and outcomes. Efforts to restore the Chesapeake Bay have been unfolding for over two decades, involving multiple states, EPA and a host of other federal agencies, and myriad

stakeholder organizations. Despite the high level of public concern and governmental investment in the Chesapeake Bay, relative to other watersheds in the country, minimal progress has been made in reducing nutrient loading to the Bay and restoring ecosystem health (Ernst, 2004; NAPA, 2007). The regulatory and voluntary policy tools used to address point and nonpoint pollution sources have not been strong enough to incentivize the substantial changes in agricultural, development, stormwater and wastewater practices that are necessary to improve conditions in the estuary.

In a contrasting case, New York City has implemented an aggressive collaborative watershed protection program to meet federal Safe Drinking Water Act regulations, as an alternative to more costly treatment options. In order to avoid building the \$6 billion drinking water treatment plant that would be required under EPA's standard regulations, the City has worked with stakeholders throughout the rural watersheds in the Catskills to institute voluntary land conservation and best management practices to protect drinking water quality at the levels required by federal law (Pires, 2004). Although the program has not been without significant ongoing conflict and negotiation between urban and rural interests (Church, 2009), it is one of the more successful examples of mobilizing regulatory and voluntary incentives to achieve water quality goals.

The third overarching theme from this research, which resonates with prior reform literature, is the *importance of effective coordination mechanisms among the networks of agencies and stakeholders needed to address watershed problems*. Watershed governance challenges often fall in the category of “wicked problems” where solutions are riddled with high complexity, uncertainty, and the need to work across multiple jurisdictional boundaries. Although presented in this research as a key facet of integrated management, coordination mechanisms are truly foundational to each of the study's reform dimensions. These mechanisms may take the form of formal collaborative institutions or more informal governance networks, but either way they must be *carefully designed and facilitated* to foster effective policy process and outcomes. Scholz and Stiftel's (2005)



cases of adaptive governance in Florida to address water resource challenges provide an instructive analysis of the opportunities, issues, and constraints facing watershed governance institutions, particularly in high conflict situations. The cases illustrate how adaptive governance institutions must grapple with key challenges which include:

1. Representation (*Who should be involved?*),
  2. Decision Process (*How can authorities and involved stakeholders reach policy agreements that serve them well?*),
  3. Scientific Learning (*How can policy makers develop and use knowledge effectively?*),
  4. Public Learning (*How can resource users and the relevant public develop common understandings as a foundation for consensual policies and policy processes?*), and
  5. Problem Responsiveness (*How well do decisions achieve natural resource management goals, including sustainability, equity, and efficiency?*).
- (Scholz & Stiftel, 2005, p. 5-6)

Addressing watershed problems with integrated, collaborative, adaptive, and results-oriented strategies requires working across programmatic, organizational, and political jurisdictional boundaries. The imperative for agencies to improve in boundary spanning roles in order to address complex policy problems is not limited to environmental governance (Kettl, 2006). The watershed reform strategies employed in the state cases in this study relied heavily on coordinator roles that perform this boundary spanning function internally among fragmented program areas and externally among agencies and stakeholders. While these investments have been important in shepherding watershed reform strategies, still only a handful of staff among the several hundreds employed by each agency are devoted to these vital coordination roles. Furthermore, the state basin planning frameworks fostered information exchange among agencies but did not generate collective commitments, resource targeting, and accountability to implement watershed improvement strategies. Therefore, state coordination mechanisms still have a long way to go in realizing the potential of interagency and stakeholder collaboration to address watershed problems. In order to advance beyond the limits of traditional regulatory and programmatic strategies, greater investment by agencies in internal and

external coordination mechanisms – *and in the ongoing process of accountable, collaborative watershed governance* – is essential.

Significant changes by federal and state agencies are needed to bolster the policy incentives and coordination mechanisms discussed above in order to make progress in watershed protection and restoration goals. Such changes will not likely occur without proactive, strategic leadership at multiple levels within agencies. Some state managers interviewed perceived that EPA's oversight of water quality programs has become increasingly driven by litigation avoidance, rather than by charting innovative pathways to make progress on confounding "wicked problems" in partnership with others. Similarly, some of the EPA managers interviewed perceive many states as reticent to move beyond traditional program role orientations to experiment with watershed approach reform strategies. Truly, innovative leadership in governance reform is needed at EPA, states, and among the array of agencies and stakeholder groups that must cooperate in achieving watershed outcomes. Useful guidance for navigating the adaptive challenges of leadership in complex policy arena is offered by Heifetz (1994) and Jones (2005).

After being immersed in the stories of these agencies' implementation processes, where watershed strategies involved such varied contexts, strategies, and outcomes, it is difficult to nail down clear cut, concise conclusions and recommendations. Some managers said they looked forward to reading the recommendations I would have for improving their watershed approach efforts. To them, my main response is *you are the experts* – you have been steeped in the realities of what worked and what has not, and you have the most seasoned perspectives on how things need to work better. My hope is that you will keep your own reform torch alive and keep taking steps toward that vision with others, despite the challenges involved in charting new territory and going against the grain of the bureaucratic system.

That said, I offer some conclusions and recommendations that have arisen from my time contemplating the cases, but that resonate with some of the conclusions of others

who have focused on reform efforts within the constraints of environmental federalism (Born & Genskow, 2000; Fiorino, 2006; NAPA, 2007). Some of the recommendations, particularly those geared towards EPA where institutional barriers to change are immense, are overly idealistic but nonetheless should be kept in view. While a dramatic culture change cannot be expected anytime soon, there is certainly much room for incremental growth in these directions.

## **Environmental Federalism Context**

### EPA Role

1. **EPA has the ability to provide important support for state watershed approach reforms.** In the 1990s, EPA helped to diffuse watershed innovations to a number of states by providing funding and guidance to assist states in developing new watershed management frameworks. The funding gave states a neutrally facilitated, structured process to get an array of agencies together in dialogue about how to better coordinate efforts in supporting watershed goals. Although the basin planning model had a number of limitations in practice, it was a beneficial first step towards reform from which states have learned and evolved. There is a need for long-term commitment by EPA to support states, which are critical partners in achieving water quality outcomes, in their process of further developing and refining watershed reform strategies.

#### *Recommendations:*

- ⇒ EPA should renew its commitment to providing resources to support state watershed reform strategies.
- ⇒ Rather than imposing a particular model or agenda in assisting states, EPA should facilitate and empower the unique initiatives that arise from states' direct experience and knowledge of what is needed in each state context.
- ⇒ In addition to supporting state watershed reform strategies, EPA should strategically utilize its full array of regulatory and voluntary tools to incentivize watershed governance at state and local levels.

2. **EPA has provided ample guidance and tools to others on how to implement a watershed approach and needs to find new ways to apply the reforms to its own core operations.** While EPA has promoted the watershed approach to states, local governments, and stakeholder groups for nearly two decades, it has not done the hard work of substantively transforming its own practices and priorities. States and other stakeholders have repeatedly called attention to the barriers created by EPA's fragmented management and overriding concern for individual program outputs. While performance management systems have begun to take water quality and watershed outcomes into account, EPA's program output focus continues to drive the priorities of state agencies.

*Recommendations:*

- ⇒ Agency leaders should model and encourage a cultural shift towards providing states flexibility to pursue reform strategies and adapt programs to local contexts; this holds greater potential to achieve water quality improvements than rigid adherence to technical standards, reporting requirements, and program output schedules.
- ⇒ Providing staff and managers with more reform-oriented training, cross-program experiences, and time in the field with local and state watershed efforts would give momentum to such a cultural shift.
- ⇒ As others have noted (NAPA, 2007), EPA needs to expand its investment and training of staff beyond traditional regulatory functions in order to play more effective roles in collaborative watershed governance processes with other agencies, states, and stakeholders

3. **EPA Regions perhaps carry the greatest potential to support internal, state, and local watershed reform efforts.** The watershed approach efforts at Region 4 illustrate the kinds of strategies that agency leaders can use to catalyze progress in integrated, collaborative, adaptive, and results-based management. Such reform efforts face technical, administrative, and social challenges, and may have to be pursued in small, incremental, humbling steps. Nonetheless:

*Recommendations:*

- ⇒ Regional managers should experiment and persevere with reform efforts, recognizing their own critical role in effectively bridging federal mandates with the flexibility needed for innovative state management.
- ⇒ Regions should use creative, strategic approaches to assist states with the resources for watershed coordination roles and forums that transcend programmatic channels of funding and accountability.
- ⇒ Regions can play important leadership roles in facilitating and supporting collaborative watershed governance processes at the state level among multiple agencies and stakeholders.

State Role

4. **State agencies can play important reform roles by bridging the array of federal and state policy tools with local watershed management efforts.** State agencies manage programs that perform monitoring, assessment and modeling; wastewater, stormwater and other types of permitting, nonpoint source and infrastructure funding, groundwater protection, and other functions. When strategically and collectively applied, these programs can bring vital resources to local watershed management. However, enhanced coordinating roles and collaborative governance forums are needed to forge effective connections with local stakeholders and across programs and policy tools. (see reform strategy recommendations below)
5. **There is no ideal model for state (or local) watershed management.** The agency reform strategies used reflect a unique blend of state contextual factors including the nature and severity of environmental problems, policy action by the legislature and executive leaders, economic resources devoted to environmental management, and the institutional configurations and roles of various agencies, nongovernmental organizations, and stakeholder groups in watershed management. However:

*Recommendations:*

- ⇒ In the trial-and-error process of reform, agencies should not get too entrenched in their own model and should seek to adapt and improve

strategies based on their own “mistakes” and learning, as well as the models available from other states and agencies.

**6. Progress in addressing pervasive watershed nonpoint source pollution problems will require stronger policy drivers and funding mechanisms at the state level.**

The power of a state-embraced environmental protection mandate is evident in comparing the implementation progress of North Carolina’s nutrient strategies with federally and court-imposed TMDLs in other parts of the country. While the nutrient strategies still face stakeholder controversy and many implementation challenges to improving water quality conditions, they are proactive strides in the right direction. Similarly, more substantial funding mechanisms like North Carolina’s Clean Water Management Trust Fund will be essential in the costly, long-term process of protecting and restoring watersheds.

*Recommendations:*

- ⇒ State legislative and executive leaders must provide, or support, the progressive policy drivers and funding incentives needed to make progress on nonpoint source pollution and other watershed problems.

## **Reform Process and Strategies**

### Reform Process

**7. Watershed reform strategies are difficult to implement, as they go against the grain of traditional agency structures, cultures, and accountability mechanisms.**

Therefore, it requires significant and sustained effort by agency leaders and managers to keep momentum going towards more integrated, collaborative, adaptive, and results-oriented management. Progress is likely to wax and wane as the mix of agency priorities and pressures fluctuate over time. Agency leadership is critical in order to continue developing and refining watershed reform strategies over the long-term.

*Recommendations:*

- ⇒ Reform principles and strategies should be revitalized periodically to reconnect managers and staff with the environmental goals that can get overshadowed in the day-to-day tasks and frustrations of the agency's work.
- ⇒ Agency staff and managers should not only be encouraged to contribute to watershed reforms, but also should be supported as needed with training, time allotted for watershed work, and clear guidance on balancing role responsibilities; this may help minimize staff feelings of resistance and being overwhelmed as they step into new roles.

### Reform Strategies

#### **8. Integrated management through effective internal and external coordination**

**mechanisms remains a critical need and challenge for agencies.** In the state cases and at Region 4, watershed coordinator roles at the state and basin level have been central in facilitating cross-program and interagency connections in watershed management activities. These roles can be challenging to support because they do not fit in the boxes of statutory responsibilities and lines of programmatic funding and accountability.

#### *Recommendations:*

- ⇒ Strategic attention should be given to how and where coordinator roles are defined. Coordinators in regional offices will have more face time with local citizens, stakeholder groups, and agencies involved in watershed management, but may have more difficulty bridging with the agency's centralized programs and vice versa (e.g. Kentucky vs. North Carolina). High level basin managers (e.g. Assistant Branch Chiefs in Georgia) have more policy authority in working with programs and stakeholders but may not have time to be intimately involved with local collaborative watershed initiatives.
- ⇒ Interagency forums are important for coordinating watershed management activities, but the challenges in moving beyond information sharing to action planning and resource targeting need to be collectively addressed.

#### **9. In certain policy-focused watershed approach strategies, states are experimenting with more substantive modes of stakeholder participation in agency decision making.** For example, Georgia has used extensive, facilitated stakeholder involvement mechanisms in the development of its state water plan and is

instituting a new model of long-term water planning by regional councils of politically appointed leaders from multiple sectors. North Carolina has tried various approaches to structured stakeholder involvement in the development of controversial nutrient rules for point and nonpoint sources, but these efforts have been challenged by fast-paced state-mandated schedules and state administrative procedures for rulemaking that can override the rules developed through consensus processes with stakeholders. By and large, however, state water programs use the standard, limited public participation methods of public notice, comments, and hearings that are required by law.

*Recommendations:*

- ⇒ Agencies should continue to experiment with and learn from efforts to apply more substantive public and stakeholder participation mechanisms, particularly in critical policy decisions that need stakeholder buy-in in order to be effectively adopted and implemented. Agency staff that interface with stakeholder involvement processes should be provided with sufficient training in collaborative techniques, and in some cases outside facilitation support, in order to constructively manage stakeholder conflicts that arise.

10. **Agency roles in watershed collaboration are expanding somewhat, particularly through support of watershed restoration activities in priority watersheds.** EPA program funding to states does not directly support collaborative roles, so agencies must elect to creatively prioritize resources for staff to engage in collaboration. In priority watershed efforts in Kentucky and North Carolina, agency coordinators have played important facilitating and capacity building roles.

*Recommendations:*

- ⇒ Agencies should invest staff time in supporting collaboration with stakeholders on watershed protection and restoration efforts. By creating and maintaining these channels with the public and local entities, agency tools and resources may be applied more effectively to make a difference on the ground, supporting the mutual water quality aims of communities and the agency.

11. **Adaptive management is a critical challenge for regulatory agencies and has not been well developed, conceptually or in practice, as a reform strategy for EPA**



**and states.** Use of the term has been increasing, and managers' interpretations vary along a spectrum from trial-and-error to passive adaptive management. The more sophisticated reform theory and active adaptive management techniques are likely beyond the practical reach and interest of state water agencies; a simple interpretation of *plan, implement, monitor, evaluate, and adjust* is a sufficiently challenging exercise for agencies at this time.

*Recommendations:*

- ⇒ Agency managers should look to Allan and Curtis's paper (2005) entitled "Nipped in the bud: Why regional scale adaptive management is not blooming" for an excellent discussion of the need for and challenges of adaptive management in bureaucratic contexts.
- ⇒ Mechanisms should be developed for, and resources devoted to, the evaluation and adjustment phase to improve watershed management strategies over time. Managers rarely have the time to step back and do this.

**12. Results-oriented management strategies can give important strategic focus to watershed efforts, but also present potential problems for holistic watershed governance reforms.** Region 4 has used an emphasis on EPA's strategic watershed outcome measures to provide a clear driving direction to state watershed coordinators, internal cross-program teams, and external collaborations with local stakeholder initiatives. A results focus can catalyze watershed efforts that may get bogged down in planning and process to pursue specific, targeted on-the-ground improvements. However, when the focus becomes too narrow on short-term measurable improvements, the holistic focus of watershed planning to achieve multiple community-based goals can be lost.

*Recommendations:*

- ⇒ Results-oriented management strategies should effectively target watershed problems but the specific outcome goals should be more broadly defined by communities and not overly driven by a narrow regulatory focus on delisting impaired streams.

- ⇒ A focus on watershed outcomes can help drive strategic integration and collaboration in agency programs, but changes need to be made in EPA's performance management system to lighten the program output emphasis which reinforces siloed management and can frustrate reform strategies.

The reform literature has produced a wealth of commentary on transforming current environmental policies and management approaches to meet the complex sustainability challenges of the 21<sup>st</sup> century. As was found in this research and other prior empirical studies of reform efforts, the path is littered with institutional hurdles, with progress often proceeding slowly and incrementally. Upon reviewing this dissertation, my committee chair indicated “reform isn’t for sissies.” Indeed, agency managers – as well as others in the wider network of watershed governance processes – face daunting challenges to foster more integrated, collaborative, adaptive, and results-oriented responses to problems. The weight and force of the status quo is tremendous. By working with and learning from practitioners involved in the day-to-day work of reform, policy scholars can assist in mapping effective pathways from principles to practice. This dissertation offers an initial step towards that goal by harvesting and exploring the experiences of state agency managers who have endeavored to implement a watershed approach. It is hoped that the findings will serve as a springboard for further dialogue and experimentation among those engaged in environmental governance reform.

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## **Appendices**

## **Appendix A: Informed Consent Statement**

(Approved by University of Tennessee Internal Review Board)

### **Informed Consent Statement**

The purpose of this interview is to gather information and perspectives on how [Agency] has implemented the watershed approach principles. Your participation in this interview is completely voluntary and confidential. The interview will be audiotaped to ensure that your comments are accurately recorded. To ensure confidentiality, relevant information from the interview will be transcribed without your name and only a general descriptor such as “agency watershed staff.” A copy of the complete interview notes and any direct quotations transcribed will be sent to you for verification of accuracy prior to use in any analysis or report. At this point, I will honor requests to take particular comments “off the record” in the case of sensitive information. If your comments are quoted in a research report, no personal identifiers will be used and a draft copy will be sent to you for review prior to making the report publicly available. The digital audio files of the interviews will be stored on the researcher’s password protected computer and deleted after a period of 5 years. Should you have any questions about this research or how it might be used, please feel free to contact the researcher by email [jmawhort@utk.edu](mailto:jmawhort@utk.edu) or cell phone at 510 290-5137. Thank you very much for your participation!

### **Consent**

I have read the above information and agree to participate in this study.

Participant's Name \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

Investigator's Signature \_\_\_\_\_ Date \_\_\_\_\_

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## **Appendix B: Introductory Emails to Interview Participants & Research Summary**

Dear [participant],

I am conducting dissertation research on state implementation of the Watershed Approach principles, using case studies of three state water quality agencies in the Southeast region. I approached [Primary Contact & Director] about studying North Carolina Division of Water Quality as one of the cases, and both were willing and interested to participate. A summary of my research project is attached.

I will be coming to conduct one-hour interviews with approximately 10 key agency managers and staff over a few days in mid-September. [Primary Contact] recommended that I interview you based on your years of experience with DWQ's watershed management approach. Would you be willing and able to participate in an interview sometime Sept. 14-16? If so, please send me your available blocks of time on those three days so that I can coordinate with others' schedules.

Thanks very much for your consideration, and please let me know if you have any questions or concerns.

Best regards,

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Dear [participant],

I am following up to confirm our plan to meet for a research interview on Tuesday morning (9/15) at 10:30am. In terms of what to expect, the interview will mostly focus on how various watershed approach principles (integration across programs/agencies, stakeholder involvement/collaboration, adaptive management, strategic focus on environmental results) have been implemented in your program area and in conjunction with others. I am interested in hearing experiences of key challenges of putting these principles into practice in the agency's context, as well as any specific successes or effective strategies that have emerged.

In order to be able to focus on the discussion and capture your points accurately, I am seeking your permission to audiorecord the interview. Your responses will be completely confidential. The attached consent form describes the steps I will take to protect your confidentiality and address any concerns about sensitive information. I hope you will feel at ease sharing your candid perspectives and inside knowledge of these issues, as it will greatly strengthen my understanding and the value of the case study findings. I will bring a copy of the attached consent form for you to sign, at which point we can address any questions or concerns you might have. I am very much looking forward to meeting you next week and learning from your experiences in this arena!

Best regards, Julie Mawhorter



## **Dissertation Research Summary: Assessing State Implementation of the Watershed Approach Reform**

### **Research Purpose**

The purpose of this study is to assess state agency implementation of the *watershed approach*, an environmental management reform framework introduced by EPA in the mid-1990s. Although definitions and interpretations of the “watershed approach” reform vary, as will be explored in this study, a simplified working definition developed for this research is: *A coordinated agency strategy (or suite of strategies) that integrates management activities at the watershed/basin scale, using a collaborative, adaptive process to achieve desired watershed results.* This definition brings attention to four reform dimensions from the environmental policy literature – integrated, collaborative, adaptive and results-based management – which provide the conceptual framework used to describe and assess watershed approach implementation in this study. A multiple case study research design is employed to understand state agency reform efforts within the overarching policy context of environmental federalism, wherein EPA policies at national and regional levels are influential in shaping state management strategies. The case studies focus on three state water quality agencies in the Southeastern US, an area where regional EPA leaders have placed a strong emphasis on watershed management reforms. With a holistic view covering the past 15 years since the watershed approach reform emerged, the study draws lessons from the experiences of agency practitioners to inform the theory and practice of environmental management reform.

### **Research Questions & Main Objectives**

#### **1. Environmental Federalism Policy Context**

*How does the environmental federalism policy context help shape state watershed approach implementation?*

- Review EPA policy framework for state water quality management; EPA watershed approach guidance and implementation efforts; Region IV watershed approach efforts (Data collection completed 2007-2008)

#### **2. State Watershed Approach Implementation Process**

*What has been the process of implementing the watershed approach reform through specific management strategies over time?*

- Summarize inception and evolution of agency’s watershed management approach, describing main strategies that have been used to operationalize the watershed approach principles (eg. changes to policy, structure, coordination, etc.)
- Review relevant aspects of state context (environmental, political, economic, institutional) and other factors that have shaped the agency’s watershed approach implementation; explore key constraining and facilitating factors

#### **3. Reform Outcomes**

*What have been the reform outcomes in terms of progress towards more integrated, collaborative, adaptive and results-based management?*<sup>2</sup>

- Assess state progress and challenges in implementing the watershed approach using these four reform dimensions from the literature

### **Research Methods**

The study will utilize qualitative research methods including document analysis and key informant interviews with agency participants. The state case studies will be conducted from August-December 2009. The majority of the data collection for each state case will be achieved through a 3-day site visit to the state agency central office for document collection and interviews with approximately 10 key informants identified through a preliminary scoping phone meeting with the primary agency contact. Interviews will be around 1 hour in length, semi-structured following an interview guide of topics, and audiorecorded with permission. Great care will be taken to protect the confidentiality of participants, as described in the attached informed consent statement which each participant and the researcher will sign in accordance with UT's Internal Review Board requirements for research involving human subjects. Each interview participant will have the opportunity to review and make corrections or additions to the interview notes transcribed by the researcher. The tentative timeline for completion of the dissertation is May 2010.

### Investigator:

Julie Mawhorter is a Ph.D. Candidate in Natural Resources at the University of Tennessee in the Department of Forestry, Wildlife & Fisheries. She holds a bachelors in biology and a masters in public administration. Her current work as a Graduate Research Assistant for the Tennessee Water Resources Research Center supports the development of the Center for Watershed Solutions, a partnership initiative of UT and the Cumberland River Compact designated under Region 4 EPA's Centers of Excellence in Watershed Management program.

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### **Elaborating the watershed approach working definition:**

#### ***Coordinated agency strategy (or suite of strategies)*** –

Interested in states that use a coordinating framework of some kind to institutionalize/operationalize the WA principles, rather than just ad hoc/informal coordination and collaboration related to watersheds; otherwise it can't really be called an agency reform effort, just the collective actions of individuals in the agency

***Integrates management activities at the watershed/basin scale*** – uses watershed/basin as unit for holistic/comprehensive management, forging integrative strategies across functional divisions (eg surface water/groundwater/wetlands) and policy tools (monitoring, planning, permitting, etc.)

***Collaborative process:*** incorporates citizens and stakeholders into agency management activities (eg. monitoring/planning/implementation) and supports collaborative watershed governance processes external to the agency

***Adaptive process:*** a flexible, iterative, learning-focused management cycle that involves assessing/modeling the watershed and alternative management strategies for meeting goals; implementing management strategies as monitored experiments; and adjusting management strategies based on system feedback, new knowledge and evolving priorities

***To achieve desired watershed results:*** Shifts focus of management from fragmented programmatic output goals towards the strategic pursuit and tracking of watershed outcome goals

## **Appendix C: Interview Guides**

### **Interview Guide 1: EPA Headquarters**

**Intro** - Could you take just a few minutes to tell me briefly about the Division/area you oversee and its connection with the watershed approach?

#### **1. State progress in implementing the Watershed Approach**

- a. What specific aspects of the Watershed Approach have states had the most success in achieving?
- b. What aspects of the Watershed Approach have states had the least success in achieving and why?

#### **2. State variation**

- a. Tell me about the variation you see in how states have responded to the call for a watershed approach?
- b. What do you see as the main factors that account for this variation?

#### **3. Adaptive management**

EPA's recent guidance on the Watershed Approach indicates that adaptive management should be used. In practice, and from your perspective, what does it mean for states to use adaptive management?

#### **4. State role**

We hear often that watershed protection requires efforts at multiple levels, from EPA to state agencies, to local watershed groups, and various partners in between. Everyone has a role to play. From your perspective, what role(s) should states play in advancing the watershed approach?

#### **5. Region 4**

Going forward, my research will focus on case studies of states in Region 4 (southeast). From your perspective, how is Region 4 similar to or different from other regions?

#### **6. Research input**

What do you want to learn about in an assessment of state watershed programs?

## Appendix C: Interview Guides – State Case Study

### IG-2a - Watershed Approach - Historical Evolution

#### 1. WA Design & Adoption

What was the process the agency went through in developing and adopting the initial watershed management approach?

- What initiated the process – any **driving factors** or leaders?
- What process was used to develop the approach and who was involved?
- Were there any key debates or tensions in the process and how were these resolved?

#### 2. WA Early Implementation

What kinds of **organizational changes** did the agency make to implement the new watershed management approach? (Eg changes to policy, structure, investing additional funding/staff)

What were the biggest **challenges** with implementing the new approach?

- How were different programs affected by these changes? How did various programs/staff respond in terms of resistance, cooperation, enthusiasm, etc?

#### 3. Major Changes over Time

What have been some of the important **changes** to the agency's watershed management approach since those early implementation efforts?

What **factors prompted** each of these changes?

#### 4. Outcomes

Looking back over this process, what have been the main **accomplishments** from implementing these watershed management reforms?

If given the opportunity to make **improvements** to the current watershed management approach, what priority changes would you focus on?

## **Appendix C: Interview Guides – State Case Study**

### **IG-2b Program Managers**

#### **1. Overview**

Could you begin by giving me a quick overview of the [program area] you oversee and what it contributes to the agency's watershed management approach?

- what watershed scale does it focus on
- program-specific/EPA-related questions

#### **2. Integrated**

How does this program work with staff in other sections of the agency to accomplish its watershed management responsibilities? (refer to coordination map - internal)

How does the program work with other agencies? (refer to coordination map - external)

#### **3. Collaborative**

How does your program incorporate stakeholder participation and involvement into decision making? (eg. Public meetings/comments; stakeholder forums, etc.)

Beyond the public input meetings that you host, do you/your staff participate in local collaborative watershed management efforts where multiple agencies and stakeholders are involved? Describe...

#### **4. Adaptive**

EPA's guidance on the watershed approach suggests that adaptive management should be used. Is adaptive management something that you are actively pursuing in your program? Describe...

Are there systems in place to monitor the outcomes of management strategies and feedback the findings into the next round of management decisions?

#### **5. Results-oriented**

As you know, there has been an increasing emphasis among federal programs on demonstrating positive results from public programs. Does your program have an emphasis on managing towards particular environmental targets and tracking progress towards those? Describe...

One approach to getting measurable results is to focus the collective efforts of agencies and stakeholders on some priority watersheds. Is this something your program is doing – how do you prioritize? Does the agency use a strategic plan to do this?

#### **6. Outcomes**

What do you see as the biggest accomplishments or strengths of the agency's watershed management approach?

What are the biggest challenges or obstacles that need to be addressed in order to make greater progress in these watershed protection and restoration efforts?

## **Appendix C: Interview Guides – State Case Study**

### **IG-2c Basin Coordinators**

#### **1. Overview/process over time**

Can you give me an overview of how the watershed management/basin planning process works? What are the main phases that you have been involved in?

#### **2. Integration and Stakeholder Involvement**

##### **i. Intra-agency**

What is the process of coordination and integration within the water quality agency? (refer to coordination map-internal). Which sections do you work most closely with, on what? Where do you see that integration is most lacking or challenged?

- Central programs – monitoring, permitting, TMDL, NPS, groundwater, quantity,
- Regional offices
- Are there teams involved, or mostly one-on-one coordination?

##### **ii. Interagency**

What is the process of coordination with other agencies and stakeholders? Start w/ agencies (refer to coordination map – external). Who do you work most closely with, on what? Where is coordination most lacking or challenged?

##### **iii. Stakeholders and Public Involvement**

How does your program incorporate stakeholder participation and involvement into decision making?

What are the key non-agency stakeholder participants that are involved in the planning and implementation process?

#### **3. Results and Adaptive Management**

i. Has there been a focus in the agency on managing for environmental results and measuring these? How has this affected your work?

ii. Is adaptive management a term that you use here in the agency – if so, how does it apply to the work that you do?

#### **4. Overall Outcomes of WA [any not discussed so far]**

ii. What do you see as the **main accomplishments** or achievements of the watershed framework so far?

What are the biggest **challenges** that KY's watershed management framework faces in fulfilling its goals and potential?



## **Appendix C: Interview Guides – State Case Study**

### **IG-2d Manager in Director's Office**

#### **1. Watershed Approach – Strengths/Accomplishments**

What do you see as the key strengths or accomplishments of the agency's watershed management approach?

#### **2. State Context/Drivers**

What factors at the state level have most shaped the watershed management strategies of the agency, either as drivers or constraints?

#### **3. EPA Context/Drivers**

In what key ways have EPA's programs and oversight shaped the agency's watershed approach, either as drivers or constraints?

#### **4. Results-Oriented Management**

EPA and other federal agencies are increasingly focused on demonstrating measurable results of programs – has this been an emphasis for you as well, and if so, what strategies are you using in the agency to pursue it?

#### **5. Recommendations to Improve WA Implementation**

Looking towards the future, are there any specific barriers or policy changes at the state or EPA level that need to be addressed to accelerate watershed protection and restoration efforts?

Within your agency's discretion, are there any priority changes that you are pursuing, or planning to in the near future, to strengthen watershed protection and restoration efforts?

#### **5. Other Input**

Are there any other issues we haven't discussed yet that are important for my understanding of this state's watershed approach?

## **Appendix D: Case Study Protocol**

### **I. Overview of Research Purpose, Questions and Design**

The overarching aim of this research was to explore how key environmental management reform principles can be effectively put into practice within the constrained environment of implementing agencies. Towards this end, the purpose of this multiple case study was to describe and assess state agency implementation of the watershed approach reform. To fulfill this purpose, three interrelated, exploratory research questions provided focus for the study:

#### Research Questions

1. How have states operationalized the watershed approach reform through specific management strategies over time?
2. What contextual factors at the federal and state level helped to shape state agency reform strategies?
3. What have been the reform outcomes in terms of progress towards more integrated, collaborative, adaptive and results-oriented management?

To address these research questions, the following research objectives will be used to guide data collection, analysis, and presentation for the EPA national/regional context chapter, the state case studies, and the cross-case analysis.

#### 1. National & Regional Policy Context (Chapter 4)

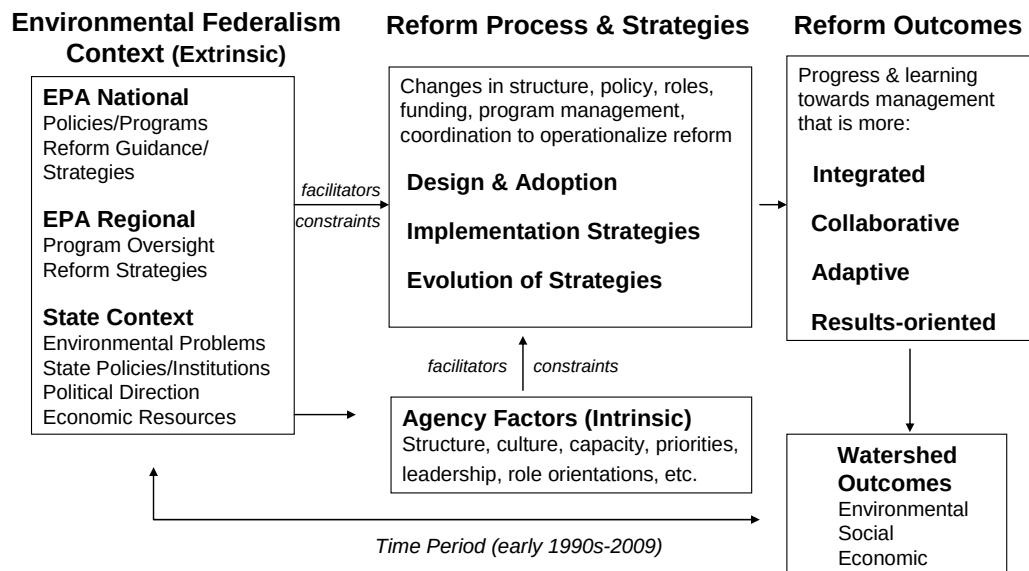
- Summarize EPA's policy framework for state water quality management, including key Clean Water Act programs
- Review EPA's watershed approach guidance and implementation efforts from adoption in 1991 to time of data collection in 2007
- Summarize EPA Region 4's watershed approach implementation efforts
- Assess the EPA context for watershed approach implementation (national and regional) using the study's four reform dimensions of integrated, collaborative, adaptive, and results-oriented management

#### 2. State Case Studies (Chapter 5)

- Review the state policy context within each case, including key environmental, policy, and institutional factors that are relevant to watershed management in the state
- Summarize the agency's design and adoption of the initial watershed approach framework including the organizational changes required for implementation
- Describe the main implementation strategies that have been used to operationalize the watershed approach reform (e.g. coordination mechanisms, stakeholder involvement)
- Summarize the evolution of the state's watershed approach strategies, including changes to the initial framework, new strategies that emerged over time, and institutional challenges that have affected implementation

- Assess the reform outcomes of the state's watershed approach using the study's four dimensions of integrated, collaborative, adaptive, and results-oriented management
3. Cross-Case Analysis/Discussion (Chapter 6)
- Synthesize and discuss findings regarding reform within the context of environmental federalism, summarizing the key EPA and state context factors that have helped to shape state watershed approach strategies over time (RQ2)
  - Synthesize and discuss findings regarding the strategies states and EPA have used to operationalize the watershed approach (RQ1) and the reform outcomes of these strategies in the four dimensions of integrated, collaborative, adaptive, and results-oriented management (RQ3)
  - Provide conclusions and recommendations regarding EPA and state agency watershed approach reforms, as well as suggestions for further research

### Conceptual Framework: State Implementation of the Watershed Approach Reform



## II. Data Collection

Data collection will be conducted in three main phases, with document collection and review occurring on an ongoing basis:

### 1. EPA National Context (November 2007)

#### Interview Methods

- Establish primary agency contact and gain permissions to conduct site visit for interviews
- Conduct scoping interview by phone for watershed approach overview, participant selection, and preliminary scheduling
- Conduct informal phone interviews with 2 EPA evaluators that had worked on watershed approach evaluations
- Schedule 2 day site visit to EPA headquarters in Washington DC to conduct 7 interviews (11/14-15/2007)
- Participants: 5 managers in EPA Office of Wetlands, Oceans and Watersheds (including 1 nonpoint source, 1 TMDL), 1 manager Office of Wastewater (NPDES), 1 senior policy expert Office of Water
- Send email invitation to each interview participant with information about the study and informed consent information; confirm schedule
- Conduct one hour interviews, recorded with digital audiorecorder, semi-structured following topics of Interview Guide 1 with questions modified to align with each participant's role and experience
- After interviews, collect documents onsite from participants and/or through follow up emails
- Transcribe interview notes and email each participant a copy of their interview notes and relevant sections of draft EPA context report to verify accuracy and provide suggested edits; transcripts should capture substance using participants' word choices but are not verbatim except where quotes are used
- Conduct informal phone interviews to gain additional perspective on state watershed approaches from two nongovernmental participants: River Network and Association of State and Interstate Water Pollution Control Administrators (May 2008)

## 2. EPA Regional Context (December 2008)

### Interview Methods

- Establish primary agency contact and gain permissions to conduct site visit for interviews
- Conduct scoping interview by phone for Region 4 watershed approach overview, participant selection, and preliminary scheduling
- Schedule 3 day site visit to EPA Region 4 in Atlanta to conduct interviews and document collection (12/2-4/2008)
- Participants: Region 4 Water Protection Division, 8 managers with most experience with EPA Region 4 and state watershed approach efforts in NC, GA, KY
- Send email invitation to each interview participant with information about the study and informed consent information; confirm schedule; have participants and researcher sign 2 copies of informed consent statement at start of interviews (1 copy for each)

- Conduct one hour interviews, recorded with digital audiorecorder, open-ended focused on 2 topics: process of watershed approach reforms at EPA Region 4, state watershed approach efforts in the 3 case study states
- After interviews, collect documents onsite from participants and/or through follow up emails
- Transcribe interview notes and email each participant relevant sections of draft EPA context report to verify accuracy and provide suggested edits; transcripts should capture substance using participants' word choices but are not verbatim except where quotes are used

### 3. State Case Studies

#### Interview Methods

- Establish primary agency contact for each state agency and gain permissions to conduct site visit for interviews
- Conduct scoping interview with each state primary contact for watershed approach overview, participant selection, and preliminary scheduling
- Schedule 3-5 day site visits to conduct interviews and document collection:
  - o North Carolina Department of Environment and Natural Resources, Division of Water Quality (9/2009)
  - o Kentucky Department for Environmental Protection, Division of Water (10/2009)
  - o Georgia Department of Natural Resources, Division of Environmental Protection, Watershed Protection Branch (11/2010)
- Participants – approximately 10 per state capturing diverse perspectives:
  - o 1-2 key informants about watershed approach adoption/early efforts
  - o 3-5 current basin-scale planner/coordinator/manager
  - o 2-3 administrator over agency and/or watershed approach efforts
  - o 1-3 program managers (nonpoint source, TMDL, permitting, etc.)
- Send email invitation to each interview participant with information about the study and informed consent information; confirm schedule; have participants and researcher sign 2 copies of informed consent statement at start of interviews (1 copy for each)
- Conduct one hour interviews, recorded with digital audiorecorder, open-ended focused on 2 topics: process of watershed approach reforms at EPA Region 4, state watershed approach efforts in the 3 case study states
- After interviews, collect documents onsite from participants and/or through follow up emails
- Transcribe interview notes and email each participant relevant sections of draft case study report to verify accuracy and provide suggested edits; transcripts should capture substance using participants' word choices but are not verbatim except where quotes are used

### **III. Questions Guiding Assessment of Reform Outcomes**

(Use in analyzing findings from each state case study and cross-case analysis to answer Research Question 3)

Integrated Management

- What have been the main accomplishments of the agency's watershed approach strategies in promoting integrated watershed management?
- What scope of watershed related issues, functions, and programs are and are not integrated? (eg water quality/quantity; surface/groundwater/wetlands; extent of program/policy tool integration)
- What scale is used to address different types of integrated management issues (eg. large river basin, watershed (HUC 8), subwatershed (HUC 12/14 etc); are tensions evident between watershed management scale and political jurisdictional boundaries?
- What coordination mechanisms are used foster integrated management 1) within the agency among program areas and 2) among other agencies and management entities?
- Are any key challenges/constraints or facilitators/drivers to integrated management evident in the case data, at the agency, state, or EPA level?

### Collaborative Management

- What have been the main accomplishments of the agency's watershed approach strategies in promoting collaborative watershed management?
- What mechanisms are used to foster public and stakeholder participation in agency watershed management activities? Consider the nature of participation using Fung's dimensions (eg. how passive vs active/deliberative, how exclusive/inclusive, how much authority/influence) Is there evidence of particular benefits and/or costs of participation mechanisms to the agency? (Irvin & Stansbury)
- What role is the agency playing in collaborative watershed governance in the state through its watershed approach strategies? (eg. leading/facilitating, regulatory/technical advisor, funding or capacity building for collaborative initiatives, etc.)
- Are any key challenges/constraints or facilitators/drivers to collaborative management evident in the case data, at the agency, state, or EPA level?

### Adaptive Management

- What have been the main accomplishments of the agency's watershed approach strategies in promoting adaptive watershed management?
- Is adaptive management a stated goal of the agency's watershed management approach? How is adaptive management interpreted in agency documents and manager perspectives?
- How do the agency's processes for watershed assessment, planning, and implementation compare to the ideal adaptive management cycle presented in the literature? (eg. NRC's 6 principles, active vs passive adaptive management steps)
- Are any key challenges/constraints or facilitators/drivers to adaptive management evident in the case data, at the agency, state, or EPA level?

### Results-Oriented Management

- What have been the main accomplishments of the agency's watershed approach strategies in promoting results-oriented watershed management?
- Does managing for results seem to be a driving focus or emerging priority in the agency, relative to other program accountability goals? Does the results focus, if evident, seem to be internally motivated and embraced or externally imposed by EPA?
- Does the agency use a prioritization process to target resources to better achieve watershed outcomes? How does the agency prioritize investments?
- Has the agency incorporated other results-oriented strategies such as strategic planning, use and tracking of watershed outcome measures, and market based strategies such as pollutant trading?
- Are any key challenges/constraints or facilitators/drivers to results-oriented management evident in the case data, at the agency, state, or EPA level?

#### **IV. Cross Case Analysis Worksheet (1 per state, then merge)**

##### **1. Environmental Federalism Context**

###### EPA Factors

- National
- Regional

###### State Factors

- Environmental problems
- Political/Policy
- Institutional/Interorganizational
- Economic Resources

##### **2. Reform Process – Operationalizing the Watershed Approach**

- Organizational strategies to implement:  
(staffing, structure, coordination mechanisms, stakeholder involvement)
- Changes over time:

##### **3. Reform Outcomes**

###### Integrated

- Scale/scope of strategies
- Coordination mechanisms – internal
- Coordination mechanisms – external

###### Collaborative

- Stakeholder/public involvement
- Agency roles in collaborative watershed management

###### Adaptive

- Defining/interpreting
- Planning/implementation
- Monitoring/adjusting

###### Results-Oriented

- Strategic planning/measures
- Priority watersheds/targeting
- Market-based



## Vita

Julie Helsel Mawhorter has pursued a path of academic learning in environmental studies that began and culminated in her hometown of Knoxville, Tennessee in the beautiful Tennessee River Valley. The path began with transformative experiences hiking in the Great Smoky Mountains, serving on a Student Conservation Association trail crew in Yellowstone National Park, and working on environmental issues at Bearden High School before graduating in 1995. At Earlham College, a Quaker-affiliated school in Richmond, Indiana, she pursued studies in the ecological sciences, with field experiences in the Alabama Gulf Coast, Bahamas, and Puerto Rico. She received a bachelor's degree in Biology with college and departmental honors in May of 1999.

In the years that followed, Julie gained experiences in organizational management, community development, and strategic planning through working with non-profit organizations in upstate New York and Oakland, California. In connecting with Dr. David Ostermeier at the University of Tennessee, she found an ideal opportunity to blend interests in effective organizational and community leadership with environmental/natural resource policy. During her time at UT from 2005-2010, she completed interdisciplinary graduate studies in natural resource policy and gained applied experience through graduate research assistantships with the Natural Resources Policy Center and the Tennessee Water Resources Research Center. Julie earned a masters degree in public administration in May 2008, followed by a Ph.D. in natural resources with a minor in environmental policy to be completed in August 2010. In March of 2010, Julie was accepted into a Presidential Management Fellow position with the U.S. Forest Service's Chesapeake Bay Watershed Forestry Program. She and her husband Ben will be moving in September 2010 to continue the path of learning in collaborative watershed governance in Annapolis, Maryland.