



Bringing  
Focus  
to the  
Issues

**Research Atlanta, Inc.**

**Georgia State University  
Andrew Young School of Policy Studies**

# **Developing a Comprehensive State Water Management Plan**

## **A Framework for Managing Georgia's Water Resources**

**James E. Kundell  
Terry A. DeMeo  
Margaret Myszewski**

Sponsored by  
GEORGIA POWER  
THE HOME DEPOT

# CONTENTS

Acknowledgments.....	iii
About the Authors.....	iv
Executive Summary.....	v
Introduction.....	1
Historic Perspective.....	1
Types of State-Level Water-Related Plans .....	3
Service Development Plans .....	4
Agency Plans.....	4
Resource Plans .....	5
Comprehensive Plans .....	5
Lessons Learned From Other States .....	6
There are Benefits to Statewide Comprehensive Water Resource Planning .....	6
Comprehensive Plans Both Communicate and Shape State Water Policy .....	7
The East- West Water Planning Difference is Gone.....	7
State Water Planning Efforts Occur at Both the State and Sub-State Levels .....	8
Different Types of State Water Plans Achieve Different Results.....	8
Roles and Responsibilities are Specified for Those Involved in the Water Planning Process .....	9
Plans Must Be Funded, Implemented, and Updated to Benefit Water Resources.....	10
There is a Nationwide Trend Toward Comprehensive Statewide Water Planning .....	11
Georgia’s Current Water Planning Efforts.....	12
Protection of Metropolitan Rivers.....	13
River Basin Management Plans .....	13
Alternatives for Georgia to Develop a State Water Management Plan .....	14
Purposes of State Water Management Plans.....	15
Guiding Principles for the Planning Process.....	15
Vision Statement .....	15
Goals and Objectives .....	16
Who Should Develop the Plan.....	18
Sub-state Water Planning.....	21
Provisions for Including Stakeholders and the Public in the Water Planning Process....	23
Funding for State Water Plan Development .....	24
Plan Implementation and Updating.....	25

Conclusions .....	26
Appendix A	
Summaries of State Comprehensive Water Planning Approaches .....	28
Florida .....	28
Hawaii .....	30
Kansas .....	32
Missouri .....	34
Montana .....	35
Nevada .....	37
Oklahoma .....	38
Utah.....	40
References .....	42

## **ACKNOWLEDGMENTS**

The authors wish to acknowledge the contributions made by numerous personnel in state water management offices nationwide. The time and historical perspectives state water management personnel provided during personal communications enriched the descriptions of state water planning functions and activities.

## ABOUT THE AUTHORS

James E. Kundell is Senior Associate and Hill Distinguished Fellow in the Carl Vinson Institute of Government and Professor of Environmental Policy in the Institute of Ecology at the University of Georgia. In addition, Dr Kundell serves as the Science Advisor to the Georgia General Assembly. Dr. Kundell, who holds a Ph.D. in environmental science from Syracuse University, is the author of over 150 books, articles, and public policy reports on water resources, air quality, growth management and sustainable development, and hazardous and solid waste management.

Terry A. DeMeo is Environmental Policy Analyst in the Carl Vinson Institute of Government at the University of Georgia and serves as the Chairman of the Robust Redhorse Conservation Committee, a multi-state recovery effort involving federal and state agencies and public and private sector groups. Ms. DeMeo holds a Masters of Landscape Architecture from the University of Georgia and authored over 30 book chapters, articles, and public policy reports on land use planning and growth management, water resources, nonpoint source pollution, imperiled aquatic species, and greenways.

Margaret Myszewski is an Environmental Policy Specialist with the Carl Vinson Institute of Government, the University of Georgia. Prior to joining the Institute, she served as a research microbiologist with the Agricultural Research Service of the USDA, investigating ways to eliminate human pathogens from poultry. Ms. Myszewski received her B.A. in biology from Drake University and holds an M.S. in medical microbiology from the University of Georgia and a J.D. with an emphasis on environmental and natural resource law from the University of Oregon School of Law.

## EXECUTIVE SUMMARY

As societal demands for water increase, the need for water-related planning escalates. The growth in population and economic activity in Georgia is placing increasing demands on the state's water resources and, thus, the need to comprehensively plan how to manage Georgia's water resources is increasing. Georgia is not alone in reaching this point. Currently nearly half the states in the country have already developed comprehensive state water management plans, are in the process of developing such plans, or are considering doing so.

The State of Georgia is currently involved in a variety of water-related planning activities, including agency plans (i.e., programmatic and strategic plans) and plans focused on specific resources (i.e., river basins, ground water) and water concerns (i.e., drought). Each of the planning efforts provides important insights and presents a strategy for how the state should address the specific concerns or manage a particular portion of the state's water resources. What is lacking, however, is a comprehensive state-level water management plan which establishes the framework for water management efforts at the state, river basin, regional, and local levels.

The purpose of this study is to identify options for Georgia to use in comprehensively planning for the management of Georgia's water resources. Based on a review of the water management planning activities of all 50 states, the following four approaches categorize state water planning efforts:

- service development plans;
- agency plans;
- resources plans; and
- comprehensive plans.

The lessons learned from the eight states with comprehensive state water management plans in place provide guidance for Georgia.

- There are benefits to statewide comprehensive water resource planning.
- Comprehensive plans both communicate and shape state water policy.
- The East - West water planning difference is gone.
- State water planning efforts occur at both the state and sub-state levels.
- Different types of state water plans achieve different types of results.
- Roles and responsibilities are specified for those involved in the water planning process.
- Plans must be funded, implemented, and updated to benefit water resources.
- There is a nationwide trend toward comprehensive statewide water planning.

Academic research and the experience of other states suggests that including the following guiding principles will aid in developing a comprehensive state water management plan:

- involving all affected parties—water users, resource managers, and policymakers;
- jointly identifying problems, alternatives, and solutions;
- pursuing consensus solutions;

- balancing competing water uses (i.e., considering both public and private values);
- coordinating water management efforts across jurisdictions; and
- allowing for continuous updating and revision in light of new problems and opportunities.

The planning process should be open and allow ample opportunity for those affected to participate. When data are limited, it should be noted and methods identified and pursued to fill data gaps.

The experience of other states suggests that, at the state level, a two-tiered approach to water planning is most effective. The comprehensive state water management plan serves as a policy document that presents the water vision, goals and objectives for the state in meeting its responsibility under the public trust doctrine to serve as a steward of the state's water resources for the people of the state. The comprehensive state water management plan thus sets the framework and provides the guidance for other state, regional and local water planning and management efforts. The second tier of state water planning is focused on the water resources (i.e., river basins, aquifers). Development of river basin management plans, which identify specific water management concerns and opportunities within each river basin, is already underway and should continue in Georgia.

To move forward on developing a comprehensive state water management plan, legislation will be required. Georgia legislation for this purpose should include:

- legislative intent;
- identification of the lead agency for developing the plan;
- requirements for interagency cooperation in developing the plan;
- identification of planning criteria, including implementation and updating provisions; and
- provisions for public and stakeholder involvement.

In addition, funding for developing, implementing and updating the plan will be required but can be handled through the normal state budget process.

Other states have found that to comprehensively plan for the effective management of their water resources, regional and/or local water planning is also necessary. If the Governor and General Assembly are interested in creating an overall water planning structure for the state, the legislation could encourage, in addition to the development of the comprehensive state water management plan, the creation, on a voluntary basis, of two types of sub-state water planning units:

- regional water districts for areas with common water problems such as the
  - > 24 coastal counties faced with the overdraft of the Upper Floridan Aquifer,
  - > Lower Flint River Basin which has unique geology and hydrology and is a high water use area, principally for irrigation purposes, and
  - > metropolitan Atlanta area; and

- watershed management councils which function as watershed planning bodies and forums for stakeholders to determine how water concerns can best be addressed within the watershed.

In addition, the legislation could direct how the lead state water planning unit should interact with these local/regional units (i.e., provision of data and information, technical assistance, etc.).

A joint policy committee of Georgia city and county officials adopted the following vision statement for Georgia.

*Our vision for the state is that all current and future Georgians have equitable access to a reliable supply of good quality water while ensuring that the resources are protective of public health and environmental quality and supportive of economic development.*

We will not reach this vision without comprehensive state water management planning designed to focus and coordinate our state, regional, and local water management efforts to move us in this direction.



## **INTRODUCTION**

The growth in population and economic activity in Georgia is placing increasing demands on the state's water resources. The state is experiencing increasing water demands both for offstream uses (i.e., public supply, industrial use, thermoelectric power production, and agricultural and other rural uses) and instream uses (i.e., navigation, hydroelectric power production, waste assimilation, fish and wildlife habitat, and recreation). Along with addressing expanding water supply demands, there is mounting interest in maintaining or improving water quality to protect drinking water and to ensure that water is safe for recreational purposes and supportive of aquatic life. Balancing the multiple demands for water supply and water quality in an equitable manner requires the state to comprehensively plan how limited water resources may be used.

Although the State of Georgia is conducting a variety of water-related plans, these tend to be agency plans (i.e., programmatic or strategic plans) and resource plans (i.e., ground water, river basin). The state is also beginning to develop a drought management plan. Each of the planning efforts provides important insights and presents a strategy for how the state should address the specific concerns or manage a particular portion of the state's water resources. What is lacking at the state level, however, is a comprehensive state water management plan which presents the vision, policies, and a framework in which the current plans should fit.

The purpose of this study is to review the water management planning efforts of other states to help identify options for Georgia to comprehensively plan for the management of its water resources. For this project, we reviewed the water planning efforts of all 50 states. Summaries of the water planning approach (and the supporting legislation) used by the eight states found to be currently undertaking comprehensive statewide water management planning are in the appendix.

## **HISTORIC PERSPECTIVE**

Water-related planning is and has been carried out by all levels of government (i.e., federal, state, and local), but the types of water planning undertaken relate to the water responsibilities of each level as they have evolved in our federal system of government. The federal government's water-related responsibilities have historically been focused on projects for which there is a national interest (i.e., major flood control, navigation, and hydroelectric power projects). Consequently, large dam and reservoir projects, such as Buford Dam and Lake Lanier, are planned, financed, constructed, and managed by the federal government. The federal government, through the U.S. Army Corps of Engineers, is also responsible for rivers and harbors and ensuring that our waterways remain navigable. Federal water-related planning has thus focused on these types of major public works projects. More recently, the federal government has become heavily involved in water quality protection. With the passage of the Federal Water Pollution Control Act Amendments in 1972 (i.e., the Clean Water Act), the federal government assumed responsibility for restoring and protecting the quality of our nation's streams, rivers, and lakes. In addition, the federal Safe Drinking Water Act, passed in 1974, sets national drinking water standards. These two federal laws are designed to deal with

water quality issues and both have stimulated planning activities, not so much by the federal government, but by state and local governments.

Local governments, historically cities but more recently counties too, have had the responsibility of providing water supply and wastewater services to their residents. Planning for these purposes has thus devolved to the local government level. Both water supply and wastewater service provision planning have focused on facility and distribution/collection infrastructure siting, financing, construction, operation, and maintenance. Growth in population has resulted in many cases in local water service provision taking on more of an intergovernmental or regional nature. In addition, with new federal and state directives relating to water quality and drinking water, local governments have expanded their planning activities to address new water quality and source water assessment requirements. These efforts have included watershed planning to better address nonpoint sources, as well as point sources, of pollution.

All states are involved in water-related planning. State governments have assumed a broad array of water-related responsibilities and thus state water planning is quite varied. Central to the state water management role is the authority to determine how water is to be allocated to competing uses. Although the federal government has far reaching authority dealing with water quality, navigable waters, and federal water projects, it is the states' role to determine how water is to be allocated to various users. As demands for water increase, the need to plan for water allocation also increases.

State-level water management planning has a long history, particularly in the arid West. Due to limited water resources, western states became involved early in our history in planning water resource projects and programs. Opening the West meant new demands for water and new economic opportunities. States were called upon to plan to meet water demands and to establish means of protecting water rights.

Changes in economic conditions have stimulated water resources planning and development efforts. In fact, development of the United States and water planning went hand-in-hand. With increasing population and expanding water demands, came greater financial resources that the states could use to address water problems.

Water planning efforts have also been initiated in response to a desire for protection against natural disasters such as droughts and floods. For example, the dust-bowl drought of the 1930s, flooding in 1951 and the severe drought of the mid-1950s resulted in major initiatives in water planning and management in Kansas in the late 1940s and again in the mid-to-late 1950s and early 1960s (Lampe, 1983). Likewise, an extreme drought during the 1950s resulted in Texas making statewide water supply planning a policy priority (Bagwell and Personett, 1997).

Although western states dominated early efforts at state water management planning, by the 1960s and 1970s eastern states had also become interested in water planning issues. For example, in the 1960s, Connecticut required an interagency group to develop a state water resource management plan. In 1972, the Florida Water Resources Act directed the Department of Natural Resources to study the state's water resources and, based on these studies, develop a

comprehensive water plan. Similarly, in the late 1970s and early 1980s, Virginia developed a state water management plan.

While early water planning efforts by the states, especially in the West, concentrated on water quantity issues, more recent efforts at addressing water resource management have allowed for a greater diversity in both type and scope. Water plans have generally begun to shift away from a project oriented approach towards a more comprehensive view of water management. The scope of these plans more frequently integrates relevant management issues such as water quality, quantity, related land use practices, and the need for water in the development of other natural resources (Miller et al., 1983). For example, many western states have found it expedient to require local land use plans to include a water quality and quantity assurance component, often done through subdivision regulations. Colorado and Wyoming both require developers to submit documentation of the existence of a water supply that is sufficient in terms of quality, quantity, and dependability and that will also be available to ensure an adequate supply of water for the proposed subdivision. In Nevada, a city or county must submit a tentative subdivision map to the Department of Conservation and Natural Resources for review as to the adequacy of water quantity. Arizona has similar legislation dealing with ground water management (Morandi, 2000). In the East, Maryland passed legislation in 1970 requiring county water and sewer plans to assure water quality and availability prior to development (M. A. C. 9; M. R. C. 26).

## **TYPES OF STATE-LEVEL WATER-RELATED PLANS**

All states carry out some form of water-related planning. The nature of the planning, however, varies considerably from state to state. A 1994 analysis of state water planning in 26 states concluded the following.

Generally, all states are conducting water quality planning statewide pursuant to the Clean Water Act and its funding. Most quality planning is not linked or integrated with quantity planning. Most states are doing or have done statewide water quantity planning some time in the last two decades. The water quantity planning is usually supported with state funds and subject to change due to new priorities. States that are most active in water quantity planning have pressing internal or external pressures, i.e., drought, conflicts, shortages, or permit programs (Ohio Water Resources Planning and Development Implementation Committee, 1995).

State water planning efforts vary in a number of ways. Some state plans focus on water supply to meet increasing and/or competing demands while others focus on protecting water quality. Some plans are statewide while others have a regional or river basin scale. Some plans help manage the water resource to meet water quality and/or water quantity goals while others focus on agency administration and programmatic requirements. Some plans may be called for by federal law for states to gain primacy to administer federal programs while others are initiated by the states to meet their own perceived needs. Although the nature of water-related planning varies among states, the intent of the plans is to help the state better manage its water resources. In addition, many current water plans provide for coordination among the state agencies, which serves to enhance implementation (Miller et al., 1983). Finally, the most effective state water

plans include provisions allowing individuals and groups affected by water management decisions to directly participate in the development of policies, programs, and management decisions (McKinney, 1990).

With the variety in focus, geographic scale, and type of state level water resources planning, we developed four categories of state water plans to help organize an understanding of the different approaches. The four categories of state water plans are:

- service development plans,
- agency plans,
- resource plans, and
- comprehensive plans.

### **Service Development Plans**

Service development plans are aligned with a service provision goal that is the current major focus of statewide planning. Usually the goal is related to managing a water resource in such a manner as to provide water service delivery to a segment of the population or to an area within the state. For example, a state may focus its statewide water resource management efforts on shifting domestic water supply from private wells to public water systems, thereby ensuring the quality of drinking water and managing ground water supplies. The identifying feature of this type of plan is on developing the water resource for enhanced service delivery.

Four states are currently investing in service development plans to manage water resources. Iowa has adopted a statewide service development plan for public water systems in areas with a population of under 10,000 people. North Dakota and South Dakota both developed statewide service development plans to manage water quantity, although South Dakota's plan is specifically targeted for large costly water projects. Kentucky also is primarily focused on a service development plan to help shift private use from individual wells and septic systems to public water supply and wastewater systems.

### **Agency Plans**

Agency water plans take the form of either strategic plans or plans focused on program administration. They describe how the agency will accomplish its water resources management goals and objectives sometimes including outcome indicators or measures of performance. While strategic plans relate to either water supply or water quality or both, the focus is on the administration of the agency charged with regulatory responsibilities for the resource rather than on management of the resource toward a stated goal or vision. Oregon and New Hampshire develop strategic plans as the primary vehicle for managing water resources.

States that approach water resources management through programmatic plans typically have numerous plans, each focused on a specific program. Water resource program plans are developed in response to regulations, or for supply and pollution control purposes, or for individual concerns or objectives of the state. For example, states develop plans for drinking water, nonpoint source control, NPDES wastewater permitting, wetlands, flood management, etc.

Many of the plans are developed to meet federal requirements to administer federal water-related programs. Fourteen states approach water resources management through development and implementation of programmatic plans: Alaska, Illinois, Indiana, Louisiana, Maine, Michigan, New Mexico, New York, Ohio, and Tennessee. Idaho, Mississippi, North Dakota, and Rhode Island develop program plans for management of water quality only.

## **Resource Plans**

Resource plans usually consider either water supply or water quality on either a statewide or river basin or aquifer scale. For example, some states develop water supply plans for the entire state, while others develop basin-wide or aquifer specific water supply plans. The same is true of water quality, some states approach water resource protection statewide and others develop basin-specific water quality plans. Another variation on resource plans is river basin management plans that include both water quality and water supply issues. Resource plans, regardless of the spatial scale and component(s), tend to serve as a data-rich resource management tool by describing the water resources opportunities and constraints in-depth.

Thirteen states have water quality resource plans, 12 develop water quantity plans and six develop basin plans that include water quality and quantity considerations. Colorado, Virginia, and West Virginia develop Continuing Planning Process plans in satisfaction of the Clean Water Act 303 (e) water quality planning requirements. The states of Nebraska, Texas, and Washington also develop statewide water quality plans. California, Maryland, New York, North Carolina, Texas, West Virginia, and Wisconsin develop water quality plans on a watershed, river basin, and/or regional level.

Louisiana, Nebraska, North Carolina, and Texas also develop water quantity plans, which are created and administered by agencies different from the ones that developed the water quality plans. Arizona's plan is primarily focused on water supply but provides some link to water quality issues. Arkansas, California, Connecticut, Idaho, Mississippi, Pennsylvania, and South Carolina manage water quantity through statewide plans, although Idaho also develops river basin water quantity plans. The states of Delaware, Massachusetts, Minnesota, New Jersey, Vermont, and Wyoming develop basin- or watershed-wide water quality and quantity plans.

## **Comprehensive Plans**

Comprehensive water plans are statewide in scale and address both water quality and water quantity. Statewide comprehensive water resource management plans articulate the state's water policy and establish the philosophical framework in which resource management will be accomplished. They may include a general description of the state's water resources and provide an overview of threats or pressures on those resources, but do not generally provide assessment level information as do resource plans. Often a comprehensive water resource management plan will identify the agencies that have a key role in managing the resource and describe how water resource management decisions are to be made including the role of the public.

Eight states have developed or are undertaking comprehensive statewide water resource management planning: Florida, Hawaii, Kansas, Missouri, Montana, Nevada, Oklahoma, and

Utah. The appendix provides a description of the comprehensive planning process and the supporting legislation used by these eight states.

## **LESSONS LEARNED FROM OTHER STATES**

Examination of the eight comprehensive state water management planning efforts shows considerable similarity in how states have approached water planning. From this examination and from considering the water planning efforts of the other states nationwide, we have identified eight lessons that can benefit Georgia in its water planning efforts.

### **Lesson 1. There are Benefits to Statewide Comprehensive Water Resource Planning**

All of the states with comprehensive water management plans have used them to articulate a statewide water resources vision, to identify policies for addressing statewide water resources issues, and to coordinate the efforts of multiple agencies.

#### Articulate a Statewide Vision for Water Resources

Comprehensive water plans can establish and/or describe a statewide water vision so that efforts of all agencies can be applied toward achieving a commonly held view. The eight comprehensive plans studied include state water visions that address management of water resources to:

- protect the health, safety and welfare of citizens;
- use, conserve, develop, protect and/or ensure sustainability;
- benefit the economy;
- benefit the natural systems;
- benefit quality of life of the state's citizens; and/or
- provide agricultural stability.

#### Address Statewide Water Resource Issues

Statewide comprehensive plans, unlike basin or regional plans, allow states to address critical statewide issues. It can help decision-makers address trade-offs between competing uses by considering the range of physical, environmental, and socioeconomic factors in evaluating alternative scenarios and balancing resource management actions from a statewide perspective.

#### Integrate Multiple Agency Efforts

Comprehensive statewide plans adopt a holistic integrated approach that address all aspects of water resource management including, but not limited to, water quality, water quantity, resource protection, and flooding and drought mitigation. Many states develop statewide resource plans, often one plan for water quantity and one plan for water quality. Yet, just as frequently those plans are developed and implemented by two, sometimes three different agencies. In addition, some states develop a statewide resource plan for water quantity and approach management of water quality through agency plans, or vice versa. If integrated under a

comprehensive plan, these plans could comprise a holistic approach but singularly they tend to foster fragmentation at the administrative level, duplication in the regulated community, and gaps in resource management and protection.

The statewide comprehensive planning approach can eliminate fragmented efforts by addressing a broad range of issues in an interdisciplinary and integrated manner. Comprehensive plans typically describe an institutional alignment and/or the role of management agencies that have primary and secondary responsibility for development and implementation of the plan. In addition, they further integrate efforts by also establishing a cooperative interagency collaboration process for plan development and resource management activities.

## **Lesson 2. Comprehensive Plans Both Communicate and Shape State Water Policy**

Comprehensive state water management plans are designed primarily to set forth state water policies, but in the process, they can also identify needs that must be addressed and future policy directions.

### Foster Implementation of State Water Policy

All of the eight comprehensive plans foster implementation of current state water policy by linking state water statutes to administration of resource management. The primary objective of Oklahoma's plan, for example, is to pursue water resource management solutions from a policy perspective, rather than from a resource management perspective. Comprehensive plans translate general policy statements in the water statutes into water resource management goals or issue statements, thereby, assisting implementation of the state's policy. Florida's plan, for example, articulates water management policies and goals that are directly based on Florida statutes.

### Affect Future Water Policy

It is common for comprehensive water management plans to identify future policy direction. Utah's comprehensive plan is an ongoing process to establish, as well as implement, the state's water management policy. Kansas' plan guides future major policy decisions by aiding state policy revisions and budget allocations. In addition, the Nevada plan recommends policy direction for addressing issues. Other plans include recommendations on resource management and/or institutional arrangements to support better water-related decision-making.

## **Lesson 3. The East-West Water Planning Difference is Gone**

Comprehensive statewide water management plans include the major issues facing any state in the United States, regardless of its location. Water supply and allocation have historically been western state issues and water quality has been traditionally considered an eastern planning issue. There is a definite trend, however, toward linking all aspects of water resource management by both eastern and western states. States are finding, for instance, that as they approach developing and implementing strategies to improve water quality of impaired streams (i.e., total maximum daily loads or TMDLs), the interdependence of water quality and

instream flows cannot be ignored. In addition, comparatively water-rich states are considering tightening their water allocation policies due to economic and population growth placing greater demands on their water resources.

Many states are beginning to realize that it does not matter how much precipitation is received if the demands for water supply and waste assimilation exceed available water. The approach a state uses to manage the resources may emphasize one type of issue over another, but western and eastern state comprehensive plans are more alike than different. Each offers a comprehensive, thoughtful framework for managing water resources that with slight alteration could be adopted by other states.

#### **Lesson 4. State Water Planning Efforts Occur at Both the State and Sub-state Levels**

All of the states conducting state comprehensive water management planning also engage in planning at smaller spatial scales including the river basin, regional, and local levels. Kansas, Utah, Montana, and Florida develop state plans and river basin plans and although Florida refers to the sub-state level as water management districts, the five districts adhere to river basin boundaries.

Oklahoma delineated eight functional planning regions that exhibit common characteristics such as geography, hydrology, and climate to organize common water resource requirements and to facilitate planning. Missouri's comprehensive plan is based on a series of technical volumes that describe state level resources and that will be used to support development of future regional water plans.

Nevada's plan includes both state and local level information and is designed to assist water managers at multiple levels of government. In addition to state and river basin plans, Utah incorporates requirements for local government water plans into the state planning process. Similarly, Hawaii incorporates county water use and development plans into the statewide comprehensive plan. Comprehensive plans function as statewide policy guides, therefore, it is not surprising that states also develop resource management plans at one or more spatial levels, resulting in a general two-tiered approach to water planning.

#### **Lesson 5. Different Types of State Water Plans Achieve Different Results**

Planning for water resource management and water quality protection does not have to be an either/or consideration of developing one type of water plan over another. There is a role for each type of plan (i.e., comprehensive, resource, agency, and service development) in serving a key role in an integrated holistic and comprehensive planning approach.

A state may consider developing a state comprehensive water management plan to articulate its water vision and policies and to establish the administrative framework to achieve them. The comprehensive plan may function as an administrative tool to provide coordination, integration, and mutual support among water resource management programs and/or among resource management agencies at all levels.

The state may also choose to develop resource plans (on a state, river basin, regional and/or local level) to describe and analyze in-depth inventory and assessment information. Agency plans help guide the agency and measure its progress toward achieving its resource management goals, thereby providing state- and federal-level accountability. In addition, service development plans are particularly useful for achieving a specific resource provision goal that may involve multiple agencies at different levels of government and/or the private sector.

## **Lesson 6. Roles and Responsibilities are Specified for Those Involved in the Water Planning Process**

Typically, the state water statute identifies an agency that has lead responsibility for developing and updating the comprehensive plan. In addition, sub-state level entities are sometimes directed to develop resource plans that support the comprehensive plan. Often, the water code also specifies other state, regional, and/or local level bodies that must be involved in the planning process.

### Lead Agency

All eight of the state comprehensive plans specify a legislatively directed lead agency. The Kansas statute for comprehensive water planning created a new agency and shifted lead-planning functions to it. Florida's comprehensive plan is prepared jointly by a state agency and five regional district entities. The Hawaii plan identifies a lead agency and also directs counties to develop local level water use and development plans. The Nevada statute assigns comprehensive plan development to a lead agency with assistance from the agency's steering committee and local, federal, and other state agencies.

### Advisory Bodies

Entities other than the lead state agency are frequently identified in the state water statute. Their role in the planning process is usually described as being either collaborative or advisory. The Missouri lead agency is statutorily directed to establish an interagency task force to execute the purposes of the plan, including plan development.

Nevada and Kansas both use advisory groups. Nevada water code directs the lead agency to gain assistance from a 15-member Advisory Board on Water Resource Planning, while Basin Advisory Committees provide recommendations on the development and implementation of the basin sections of the Kansas comprehensive plan.

The Utah water statute also directs the involvement of Basin Planning Advisory Groups but has additional requirements for plan review and comment from a State Coordinating Committee, representing 11 water-related state agencies, and Local Advisory Groups, representing stakeholder views. Montana water code emphasizes a collaborative consensus-based planning process. Therefore, it has developed a five-phase planning process that involves a governor appointed State Water Plan Advisory Council, which solicits water concerns from all sectors of the state. The Montana process also uses a Technical Advisory Committee for input to

statewide issues and a Citizen Advisory Committee for basin issues. In addition, a Legislative Water Policy Committee must approve the Montana plan prior to consideration for adoption.

### Public Involvement

State water statutes usually describe the public's role in reviewing and commenting on the state comprehensive water plan. Broad public review and involvement is sought in the development of the Montana, Nevada, and Utah plans. Kansas directs that numerous public and private entities and the general public be involved in preparation of the plan. Furthermore, the framework Hawaii has instituted to update its plan specifies community participation in the planning, decision-making, and implementation processes.

### **Lesson 7. Plans Must Be Funded, Implemented, and Updated to Benefit Water Resources**

There is a broad distinction between plan development and plan implementation. The development of any type of water resource plan does not necessarily address agency capacity or political will. Agencies at all levels must have the technical, managerial, and financial capacity to develop and implement water plans. In addition, state leadership must provide a political commitment to direct and fund the agency efforts. Planning is of little value if it does not lead to policy implementation, resource management activities, and increased public awareness. Well-developed comprehensive water management plans that exist only as "shelf art" do not benefit the state's citizens or its water resources.

### Funding for Plan Development and Implementation

Of all the states, the Kansas statute most directly specifies funding sources for plan development. The Kansas Legislature created a fund to receive money from the state general fund, a water tax, and water fines. The Florida water code specifies that the comprehensive plan must indicate linkages to the budget of the lead agency and identify the cost and source of supplemental funding to implement the plan. Montana's comprehensive plan also must include funding strategies for its implementation.

### Plan Implementation

Often, the state water statute directly states or implies that the comprehensive plan should guide future actions of the lead agency and other institutions. Montana calls for the inclusion of necessary legislative and administrative actions and a time schedule for implementing aspects of its plan. The Florida plan provides rules and schedules for implementing water management responsibilities and requires an annual progress report on the status of plan implementation. The Hawaii statute also requires implementation of the comprehensive water resources plan in the regulation and management of the state's water. The state's framework for updating the plan describes the various roles of the agencies charged with its revision and provides a schedule and implementation plan for its update.

## Plan Revisions

A stated frequency for updating the water plan is a standard directive established in the state water statutes and often the update cycle is specified. The Kansas plan must be revised annually based on an evaluation of program outcomes. Montana also requires monitoring and evaluation of resource management actions and based on the results, plan revisions are made as needed. Florida and Hawaii must complete five-year revisions, while Oklahoma requires a 10-year revision cycle with continuous updates between submissions. Missouri and Nevada water statutes specify periodic plan updates and Utah's revision schedule is every 10 – 15 years.

### **Lesson 8. There is a Nationwide Trend Toward Comprehensive Statewide Water Planning**

In addition to the eight states currently managing water resources through comprehensive plans, eleven other states are in the process of adopting this strategy and several others are considering it. Alaska has recently embarked on comprehensive water management planning through development of a draft process that is undergoing review and approval by the governor, the legislature, and the public. Connecticut has a long-standing commitment to develop a comprehensive water resources plan, which at present it is approaching through the identification of data gaps and the development of programs to acquire the critical data. Kentucky is considering moving from a service development planning process toward a comprehensive statewide water planning strategy.

A recent governor-appointed task force represents Illinois' fourth or fifth revisit to the need for state water law that may include a more comprehensive planning approach. Likewise, Maine and Ohio have approached considering statewide planning for managing water several times through different avenues, some of which are ongoing or are being revived. In addition, Mississippi, like Illinois, is facing resource needs and a political climate that may soon direct a revisit to the entire body of state water management law.

In Nebraska, a recently completed analysis of options to develop a comprehensive management plan for the state's water resources is currently under consideration. Pennsylvania is in the process of drafting comprehensive statewide policy through an Integrated Water Resource Management Team to link the water quantity and water quality relationship with resource issues. In Vermont, there has been considerable recent legislative support for the development of a statewide framework based on the Kansas model. Lastly, Washington, like several other western states, is experiencing a statewide crisis relative to managing water resources for the recovery of endangered salmon, which may force a philosophical shift toward comprehensive water resources planning and management.

Consequently, nearly half the states have comprehensive state water management plans in place, are in the process of developing such plans, or are considering the need to comprehensively plan to meet their water management responsibilities.

## GEORGIA'S CURRENT WATER PLANNING EFFORTS

As previously discussed, state water-related plans can be categorized as:

- service development plans,
- agency plans,
- resource plans, and
- comprehensive plans.

Georgia's current water planning efforts tend to fall into the second and third categories (i.e., agency and resource plans), although legislation exists which enables the state to undertake service development plans relating to water supply reservoirs (§12-5-470 et seq).

The Environmental Protection Division (EPD) of the Georgia Department of Natural Resources (DNR) has developed agency plans to obtain primacy for administering federal water quality programs under the Clean Water Act and the Safe Drinking Water Act. EPD has also undertaken strategic planning and is involved in a variety of planning efforts relating to specific programs and integration of programs.

State water planning in Georgia, however, tends to be resource focused. The most significant water planning effort underway in the state currently relates to the "water wars" negotiations between Georgia, Florida, and Alabama. The complexity of the issues relating to the two river basins included in the negotiations (i.e., Apalachicola-Chattahoochee-Flint and the Alabama-Coosa-Tallapoosa) requires that considerable data gathering and planning take place.

In addition, the state has developed a ground water management plan. The plan emphasizes management activities "to prevent pollution, establish priorities, protect aquifers, insure consistency, and coordinate the administrative functions within EPD so that sustainable quantities of high-quality ground water will be available for future generations" (Georgia Geologic Survey, 1998, 1-4). In addition to the ground water management plan, EPD is involved in resource studies in two areas of the state that have exhibited ground water-related problems. One study is of the ground water overdraft of the Upper Floridan Aquifer in 24 coastal counties. The other study is focused on water concerns in the lower Flint River basin due, primarily, to the high concentration of irrigation water use in that area. The state is undertaking multi-year sound science studies in both areas to better understand the water resource situation and options for addressing them.

The state is also in the process of developing a drought management plan. Although this plan was called for in the late 1980s, more pressing water-related concerns resulted in this planning effort being postponed. Current drought conditions have renewed interest in developing the drought management plan.

State law in Georgia also calls for two specific water resource planning endeavors, one relating to the Chattahoochee River and the other relating to the river basins in the state.

## **Protection of Metropolitan Rivers**

In 1973, the Metropolitan River Protection Act was passed, which applies specifically to the Chattahoochee River from Buford Dam to Peachtree Creek in Atlanta (ch. 128). This legislation directs local metropolitan governments to use the police powers of the state, in accordance with a comprehensive plan, to:

- consistently protect the water quality of any major stream, the public water supplies of the county or municipality, recreational values of the major stream, and private property rights of landowners in order to prevent activities which contribute to floods and flood damage, control erosion, siltation, and intensity of development;
- provide for the location and design of land uses to minimize the adverse impact of development on the major stream and flood plains; and
- provide for comprehensive planning for the stream corridor in such areas (§12-5-442(b)).

The comprehensive plan determines land use criteria for flood and flood damage prevention, erosion and siltation control, water quality protection, and intensity of development in the Chattahoochee River corridor (§12-5-443(1)). In 1975, the statute was amended to require that any land and water use plan be prepared with the assistance of the county or city governments that have jurisdiction over the affected land (ch. 837, §3). A 1989 amendment allows the regional development center to revise the plans or portions of the plan from time to time. The center is also directed to undertake any studies of water and related land resources problems in the stream corridor that are necessary in the preparation or revision of the plan (ch. 1317, §6.6). The 1998 revisions to the Act extend the area along the Chattahoochee River covered by this law to the Fulton and Douglas County borders (§ 12-5-441 (18)).

## **River Basin Management Plans**

Legislation directing EPD to develop River Basin Management Plans was enacted in 1992, and has not been significantly amended since that time (ch. 1896, §1). These plans are to be completed not later than five years after they are initiated (§12-5-521). The plans are to include:

- a description of the watershed, including the geographic boundaries, historical, current, and projected uses, hydrology, and a description of water quality, including the current water quality conditions;
- an identification of all governmental units that have jurisdiction of the watershed and its drainage basin;
- an inventory of land uses including point and non-point sources of pollution;
  - > a description of the goals of the management plan, which may include:
  - > educating the general public on matters involving the environmental and ecological concerns specific to the river basin,
- improving aquatic habitat and reestablishing native species of fish;
- restoration and protection of wildlife habitat, and provisions for recreational benefits; and
- a description of the strategies necessary to accomplish the goals of the management plan (§12-5-522).

The director of EPD appoints a local advisory committee for each river basin to provide advice and counsel to the director during the development of the management plan (§12-5-523). Completion of the plan is followed by a period for public comment. Comments received are evaluated and the final draft of the plan is submitted to the Board of DNR for consideration and adoption (§12-5-524).

Georgia's water-related planning efforts focus principally on agency plans and resource plans, although state law provides authority to undertake water supply planning and activities relating to reservoir construction. Georgia however has not undertaken a comprehensive water management planning approach that sets forth the vision, goals, and objectives to guide these other planning and water management efforts.

## **ALTERNATIVES FOR GEORGIA TO DEVELOP A STATE WATER MANAGEMENT PLAN**

With increasing demands being placed on Georgia's water resources, both for instream uses and withdrawals for multiple purposes, and the increasing need to address contaminated runoff from land, as well as point discharges of pollutants, the management of water resources is becoming more complex. This greater complexity is coupled with an increased need to comprehensively plan how to manage Georgia's water resources. Georgia is not alone in reaching this point. Currently, nearly half the states in the country have already developed comprehensive state water management plans, are in the process of developing such plans, or are considering doing so. These states are faced with a diversity of water-related issues and concerns and include arid western states (i.e., Montana, Nevada, Utah), midwestern states (i.e., Ohio, Kansas, North Dakota), eastern states (i.e., Connecticut, Delaware, Pennsylvania), and southern states (i.e., Arkansas, Florida, South Carolina, Texas).

This section uses the insights gleaned from the review of planning legislation and planning efforts in other states to suggest options for developing a comprehensive state water planning approach for Georgia. At this point, it may be helpful to review the lessons learned from the eight states with comprehensive water management plans in place:

- There are benefits to statewide comprehensive water resource planning.
- Comprehensive plans both communicate and shape state water policy.
- The East - West water planning difference is gone.
- State water planning efforts occur at both the state and sub-state levels.
- Different types of state water plans achieve different types of results.
- Roles and responsibilities are specified for those involved in the water planning process.
- Plans must be funded, implemented, and updated to benefit water resources.
- There is a nationwide trend toward comprehensive statewide water planning.

We also review the current Georgia state organizational structure to determine how the planning functions might be carried out with our current arrangements or how the structure might be altered to better allow for the development of a state comprehensive water management plan.

## **Purpose of State Comprehensive Water Management Plans**

A comprehensive state water management plan should serve as a policy document that presents the water vision, goals, and objectives for the state in meeting its responsibility under the public trust doctrine to serve as the steward of the state's water resources for the people of the state (Kundell and Tetens, 1998). The comprehensive state water management plan thus sets the framework and provides the guidance for other state, regional, and local water planning and management efforts.

Stephen Draper, who has spent the past few years studying water issues in Georgia and discussing options for addressing the issues with a wide array of water professionals and stakeholders, suggests that the comprehensive state water management plan should include at least the following components:

- coordination of regional plans;
- management options for droughts and floods;
- coordination of state and federal activities;
- coordination of inter-regional interbasin water transfers providing basin-of-origin protection;
- review of the existing water withdrawal permit system; and
- inclusion of sufficient resources for its implementation (Draper, 2000).

## **Guiding Principles for the Planning Process**

It is important for the state water management planning process to incorporate some guiding principles for developing the plan. According to one analysis these should include:

- involving all affected parties—water users, resource managers, and policymakers;
- jointly identifying problems, alternatives, and solutions;
- pursuing consensus solutions;
- balancing competing water uses (i.e., considering both public and private values);
- coordinating water management efforts across jurisdictions; and
- allowing for continuous updating and revision in light of new problems and opportunities (McKinney, 1990).

The planning process should be open and allow ample opportunity for those affected to participate. When data are limited, it should be noted and methods identified and pursued to fill data gaps. From our review of state water planning efforts, these principles are commonly employed by states conducting comprehensive state water planning.

## **Vision Statement**

A vision statement that looks 20 to 50 years into the future is important. It identifies what the ideal water situation would be at that time. Water management decisions can then be evaluated as to whether or not they lead toward meeting the state's vision or not. Some examples of vision statements included in state plans are as follows.

- It is the vision of water management for the 21st Century that North Dakota will enjoy an adequate supply of quality water. Water resource management will ensure health, safety, and prosperity; and balance the water needs for present and future generations.
- We envision a Vermont where people live in harmony with diverse and healthy natural systems; appreciate and enjoy our natural resources; understand the environment; work together responsibly to reduce waste and risks to human health and the environment; and prosper without significant degradation of natural systems.

A joint policy committee of Georgia city and county officials adopted the following vision statement for Georgia (Association County Commissioners of Georgia and Georgia Municipal Association, 1999, 2).

Our vision for the state is that all current and future Georgians have equitable access to a reliable supply of good quality water while ensuring that the resources are protective of public health and environmental quality and supportive of economic development.

In reviewing other state water plans, we found no vision statement that better captures the ideal future water situation than this statement.

## **Goals and Objectives**

In addition to presenting a vision for water management, state water plans usually contain goals and objectives to be met in managing the state's water resources. For example, Kansas identifies nine specific goals:

- the development, to meet the anticipated future needs of the people of the state, of sufficient supplies of water for beneficial purposes;
- the reduction of damaging floods and of losses resulting from floods;
- the protection and the improvement of the quality of the water supplies of the state;
- the sound management, both public and private, of the atmospheric, surface and ground water supplies of the state;
- the prevention of the waste of the water supplies of the state;
- the prevention of the pollution of the water supplies of the state;
- the sound coordination of the development of the water resources of the state with the development of the other resources of the state; and
- the protection of the public interest through the conservation of the water resources of the state in a technologically and economically feasible manner.

Similarly, Florida states that the overall goal of the Florida Water Plan is to ensure the long-term sustainability of Florida's water resources for the benefit of the state's economy, natural systems and quality of life. The plan is based on the principles that the water resources must be managed to meet the water needs of people while maintaining, protecting, and improving the state's natural systems and that effective management of water resources requires collaboration and cooperation among all affected parties. The plan specifically identifies key goals or guidance statements.

- Water Supply
  - > Florida shall assure the availability of an adequate supply of water for all competing uses deemed reasonable and beneficial and shall maintain the functions of natural systems and the overall present level of surface and ground water quality. Florida shall improve and restore the quality of waters not presently meeting water quality standards.
  - > It is the intent of the Legislature that future growth and development planning reflect the limitations of the available ground water or other available water supplies.
  - > The encouragement and promotion of water conservation and reuse of reclaimed water...are State objectives.
  
- Flood Protection
  - > Require local governments, in cooperation with regional and state agencies, to adopt plans and policies to protect public and private property and human lives from the effects of natural disasters.
  - > Encourage the development of a strict floodplain management program by state and local governments designed to preserve hydrologically significant wetlands and other natural floodplain features.
  
- Water Quality
  - > It is declared to be the public policy of this state to conserve the waters of the state and to protect, maintain, and improve the quality thereof for public water supplies, for the propagation of wildlife and fish and other aquatic life, and for domestic, agricultural, industrial, recreational, and other beneficial uses and to provide that no wastes be discharged into any waters of the state without first being given the degree of treatment necessary to protect the beneficial uses of such waters.
  - > Florida shall improve and restore the quality of waters not presently meeting water quality standards.
  
- Natural Systems
  - > Conserve forests, wetlands, fish, marine life, and wildlife to maintain their environmental, economic, aesthetic, and recreational value.
  - > Reserve from use that water necessary to support essential non-withdrawal demands, including navigation, recreation, and the protection of fish and wildlife.
  
- Coordination
  - > Systematic planning capabilities shall be integrated into all levels of government in Florida with particular emphasis on improving intergovernmental coordination and maximizing citizen involvement.

Minnesota's water goals are to safeguard Minnesota's water resources for the future and to meet current needs, while recognizing water's limits and interconnections, its changing and variable nature. To achieve these goals, 12 objectives are identified for the next 10-year period.

- To make water management in Minnesota more understandable, efficient and directed toward meeting state goals.

- To develop and carry out a statewide water resources information and education strategy as an integral part of the state's new environmental education program.
- To uniformly enforce Minnesota law and fairly assign liability through it so that the environment is fully protected and the burden on people innocently exposed to water misuse is minimized.
- To place state and local programs on a sound financial footing by targeting limited resources to priority needs and by expanding revenue sources.
- To adopt a coordinated, interdisciplinary approach to managing the Minnesota lake environment.
- To protect and restore wetlands while recognizing their importance in watershed-based management strategies for lakes, rivers and ground water.
- To manage rivers, both large and small, with their related land resources as units.
- To make protection of ground water quality and quantity a routine consideration in all governmental decisions.
- To build degradation prevention goals into all Minnesota programs and practices affecting water.
- To strengthen protection and management of water wells at the state and local level.
- To develop a coordinated local-state program to ensure that Minnesotans have enough water to meet their long-term needs.
- To help sustain the quality of Minnesota's environment by recognizing water's interconnections.

As the Kansas, Florida, and Minnesota plans suggest, the goals and objectives in the state water management plans can serve to integrate a broad range of water-related activities so that they complement rather than compete with each other.

### **Who Should Develop the Plan?**

A basic question relating to developing a comprehensive state water management plan is who should do it. The review of other state plans provides no clear direction for Georgia to follow. Each state has approached development of its plan differently, although there are commonalities including identification of a lead agency and requirements for interagency cooperation.

#### Lead Agency

Lead agencies assigned responsibility to develop state water management plans in other states include the Oklahoma Water Resources Board, the Montana Department of Natural Resources and Conservation, the Kansas Water Authority, the Nevada Division of Water Planning within the Department of Conservation and Natural Resources, and the Utah Division of Water Resources within the Department of Natural Resources. It appears that each state creates a unit of government or assigns the planning responsibility to an existing unit of government depending on the political and programmatic situation in the state. However, in a review of the Montana water planning process, McKinney concluded that a state water planning "commission" with its own staff was necessary (1990).

In Georgia, the state agency with the broad mandate to manage the state's water resources is EPD. All water quality and water withdrawal permitting authority has been assigned to EPD, as have other responsibilities related to water monitoring, water studies (through the State Geologic Survey), and dam safety. In addition, EPD is charged with developing river basin management plans and other water-related plans as needed. For these reasons, EPD would be a logical agency to assign the responsibility to develop a comprehensive state water management plan.

Local government officials have argued, however, that an "office, separate from EPD but which communicates, cooperates and coordinates its activities with EPD and other state agencies and authorities whose decisions affect water protection and management" should be created to "develop a comprehensive state water resources management plan and coordinate state, regional and local water management planning efforts" (Association County Commissioners of Georgia and Georgia Municipal Association, 1999, 3). Adding support to this position is the fact that EPD, which has been understaffed and focused on other priorities such as the water negotiations with Alabama and Florida, has not developed a drought management plan that was called for a decade ago. In addition, although EPD has major water-related responsibilities, they do not have all state water-related responsibilities. Other divisions within DNR have roles in water management. For example, DNR's Wildlife Resources Division has responsibilities relating to aquatic habitat and management of the state's fisheries. So too, the Coastal Resources Division of DNR oversees the coastal marshlands and has responsibilities relating to coastal shellfisheries and fisheries. In addition, the Pollution Prevention Assistance Division of DNR provides technical assistance to industries and others on how to decrease generation of pollutants. Other state agencies, such as the Soil and Water Conservation Commission and Department of Community Affairs, also have water-related responsibilities. Consequently, assigning the state water management planning responsibilities to another unit of government is an option.

No other state agency, however, has major water planning responsibilities. As a result, an independent office or commission could be created or the responsibilities for developing the state water management plan could be assigned to an existing unit of state government. Options include assigning the water management planning responsibilities to one of a number of existing units.

#### *Governor's Office*

Attaching a new water resources planning office to the Governor's Office places it at the heart of state government and close to the center of the decision-making process. The governor, however, may not be inclined to have another office reporting directly to him and would, thus, prefer that it be housed elsewhere.

#### *Governor's Office of Planning and Budget*

One step away from the Governor's Office is the Office of Planning and Budget (OPB). This office, as its name implies, has planning responsibilities and conceivably could take on water planning responsibilities. The major focus of OPB, however, is the state's budget and it may resist taking on water planning responsibilities.

### *Georgia Regional Transportation Authority*

The Georgia Regional Transportation Authority, or GRTA, has state agency oversight responsibilities. In addition, it has broad ranging authority as the Governor's Development Council to address growth related matters. GRTA could take on water planning responsibilities and mesh them with their transportation and growth planning efforts. GRTA, however, already has a great deal to do without adding more to its workload.

### *Commissioner of DNR's Office*

Assigning the responsibility to the Office of the Commissioner of DNR brings the various divisions within DNR together in the planning process but does not necessarily include other state agencies in the process. This, of course, could be addressed through an interagency agreement.

### *New Division within DNR*

Alternatively, but closely aligned to assigning the water planning responsibility to the DNR Commissioner's Office, is to create a new division within DNR and assigning water planning responsibilities to this new division. This would separate the water planning activities from EPD and identify the new division as the responsible unit for comprehensive water management planning.

### *Georgia Department of Community Affairs*

The Georgia Department of Community Affairs (DCA) has planning responsibilities relating to the growth strategies legislation passed in 1989. They also have some environmental responsibilities as they relate to local governments' comprehensive and solid waste management plans. Their role, however, has been principally to provide technical assistance to local governments and to oversee the local planning process. DCA's water-related responsibilities and state planning activities are quite limited. It would be possible, however, to assign state water management planning responsibilities to DCA.

### *Georgia Environmental Facilities Authority*

The Georgia Environmental Facilities Authority (GEFA) provides grants and loans to local governments, primarily for environmental infrastructure purposes. Funding of water infrastructure is an important factor relating to water planning. GEFA, however, has not been a policy making agency, serving more to provide assistance to local government in financing their infrastructure needs. Combining water planning and financing responsibilities in one agency provides certain benefits.

### *Georgia Soil and Water Conservation Commission*

The Commission is the only state agency outside of DNR that has substantive water-related responsibilities. The Commission was established principally to link the expertise of the

U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service, to the agricultural community. Its primary focus is to provide technical support, in cooperation with NRCS, to help farmers and others to control erosion and sedimentation. It does this through a system of Soil and Water Conservation Districts throughout the state. To take on the responsibilities of developing a state water management plan, the Commission's focus would have to be broadened to better address urban and suburban problems, potentially involving a change in mission, Commission composition, and organizational operations. This is not to say that the Commission does not already deal with urban and suburban concerns, but it could be better organized to do so.

Creating a separate state water planning unit also requires consideration of potentially shifting existing water-related responsibilities to the new office. For example, the State Geologic Survey and the river basin planning functions, currently located in EPD, might be assigned to a new water planning unit. Before doing so, however, consideration should be given to how the move would affect the other water-related activities within EPD.

Assigning responsibility to serve as the lead agency in developing the state comprehensive water management plan to EPD or another unit of state government is ultimately a political decision. Although the water planning function can be carried out in any of these organizational locations, it would probably work better in some than in others. An important consideration, however, is that it be provided the authority and financial resources necessary to carry out the planning responsibilities and to gain the cooperation of other agencies that need to be involved in the planning process.

### Interagency Cooperation

Because water is involved in so many aspects of our lives, it is natural that multiple state agencies would be involved in water-related activities. Consequently, every state is faced with the need for interagency cooperation in the state water management planning process. State legislation normally directs that agencies cooperate with the lead agency in developing the state water management plan. For example, Utah's legislation states: "All other ...agencies shall cooperate with the Division of Water Resources in the formulation of a state water plan..." (§73-10-15). The legislation enacted in Kansas directs a number of specified agencies to cooperate with the Kansas Water Office in the formulation of the state water plan (§82a-903). Missouri created an interagency task force to work with the Department of Natural Resources to develop the state water management plan and directs the task force to meet at least semiannually (§640.430(1)(2)). An alternative, but probably less effective way, to gain interagency cooperation is for the governor to issue an executive order directing agencies to cooperate with the lead agency in the state water management planning process as Governor Ventura did in Minnesota (Executive Order 99-15, 2000).

### **Sub-state Water Planning**

As previously noted, a committee composed of city and county officials has argued that a separate office should be created to "develop a comprehensive state water resources management plan and coordinate state, regional and local water management planning efforts" (Association

County Commissioners of Georgia and the Georgia Municipal Association, 1999, 3). Certainly, the state water plan should set the framework for other state water planning efforts, such as the river basin management plans, the drought management plan, the ground water management plan, and any other state water-related plans. In addition, the experience of other states suggests that the state water-planning unit should assist regional and local water planning bodies. This is in part due to the nature of the state water planning effort. In developing the state water plan, the planning unit becomes a repository of data and information that is valuable to regional and local water planning bodies. Sharing data and information becomes an important function in the overall efforts of the state to plan effectively for the use and protection of its water resources. It is also important to coordinate these efforts so that they complement rather than conflict with each other.

The state approach that has received the most support nationally is a two-tiered planning process with a statewide water management plan that sets the water policies for the state and river basin management plans that specifically address water management in the basins within the framework set by the state plan. At the local/regional level a two-tiered approach may also be beneficial, although not all parts of the state need both or, in some cases, either of the components. At the sub-state level, the water management district approach (sometimes referred to as capacity use areas) can be used for regions with common water challenges to plan and, possibly, to manage water resources on a regional basis. Regions which face common water challenges in Georgia include the 24 coastal counties which withdraw water from the Upper Floridan Aquifer; Southwest Georgia which is an area with considerable interchange between surface water and ground water due to the dissolvable limestone bedrock that outcrops in the area; and the metropolitan Atlanta region that is faced with common water supply, wastewater, and stormwater concerns. Providing a structure by which the local governments in these regions can collectively plan and, if necessary or desirable, to manage water resources would be beneficial.

Additionally, an approach used widely across the country is to create watershed management councils to address water quality concerns within a watershed. Watershed management councils generally undertake watershed planning activities and serve as forums to bring stakeholders together to determine how to address water concerns. The Georgia General Assembly has already created two such councils, the Lake Allatoona Preservation Authority and the Lake Lanier Watershed Governance Council to address concerns with water quality in two of Georgia's most important lakes. Although these two councils focus on multi-county watersheds, councils could be created for very small watersheds located entirely within one local jurisdiction. An option that might be explored by Georgia is to mesh the planning and stakeholder involvement functions of the watershed management council with the efforts of a local stormwater utility. Since both of these mechanisms focus, at least in part, on controlling nonpoint pollution, creating a utility overseen by or cooperating with a watershed management council brings the planning and stakeholder involvement functions together with the on-the-ground efforts to control stormwater runoff and provides financial resources to carry out these activities.

These two sub-state mechanisms are complementary and can mesh well with state water planning activities. Regional districts, where needed, can provide area-wide guidelines while

watershed management councils allow for addressing watershed specific concerns. Although organic legislation might be necessary or helpful for creating both types of sub-state water planning bodies, their creation should be voluntary, based on the challenges and wishes of the people in the region or watershed.

### **Provisions for Including Stakeholders and the Public in the Water Planning Process**

States have adopted a variety of mechanisms to ensure that stakeholder groups and the public have the opportunity for involvement in the water planning process. These include the creation of advisory committees, focus groups, and use of public meetings and hearings.

Water is used for various purposes by a wide range of interests. Consequently, in developing a state water management plan, it is important to provide means for involving water users in the process. Public involvement efforts are generally quite extensive. For example, North Dakota received public input in the following ways:

- 2500 random public surveys;
- 24 public meetings;
- 67 water management board surveys;
- federal agency committee input;
- state agency committee input;
- non-governmental organization committee input;
- major project committee input; and
- technical oversight committee input.

One option used widely by states is to create planning advisory bodies made up of representatives of various water user groups or stakeholders. For example, the Nevada legislation directs the governor to appoint an Advisory Board on Water Resources Planning and Development within the Division of Water Planning that has the following responsibilities:

- to advise the division on matters related to the planning and development of water resources;
- to advise and make recommendations through the division and the state Department of Conservation and Natural Resources to the governor concerning policies for water planning and the development of water resources;
- to advise the administrator concerning the policies of the division and areas of emphasis for the planning of water resources; and
- to review, and provide written recommendations to the division regarding the water plan.

The advisory board is made up of representatives of counties, water utilities, one representative of the general public, and four members, each of whom represent one of the following interests: farming, mining, ranching, and wildlife (540.111 (9)).

The Utah Division of Water Resources writes the initial draft water plan and provides it to a state coordinating committee comprised of 11 water-related state agencies for review and comment. The revised plan is then provided to local advisory groups that represent various

stakeholders for review and comment. The draft plan is released for comment in public hearings (Utah State Water Plan, 1990).

The Montana State Water Plan Advisory Council, a governor appointed decision-making body, solicits water management concerns through the use of focus groups composed of water users, resource managers, and the public. Once identified and selected, Technical Advisory Committees (for statewide issues) or Citizen Advisory Committees (for basin-specific issues) analyze the problems, develop options, and recommend actions (Strategic Plan, 1998).

The use of advisory bodies is common in Georgia. One question that must be addressed, however, is whether to use an existing body or to create one specifically for this purpose. The answer to this question might rest, in part, on where the lead agency conducting the plan is located organizationally. EPD already has an environmental advisory committee that could serve this function. If the unit is attached to another existing department or agency which has a board (i.e., Board of Natural Resources, State Soil and Water Conservation Commission), the board/commission may serve the function of an advisory body or another body may be created. In any event, an advisory body composed of representatives of water interests can provide helpful insights in the state water management planning process.

In addition to creating an advisory body, it is very important to provide ample opportunity for stakeholder groups and the public to be involved in the development of the state water management plan. Most states require the implementing agency to hold public hearings. The majority of state planning efforts, however, include opportunities for widespread public input beyond just public hearings. Focus groups, advisory groups, and other mechanisms are used extensively to ensure that all interests have the opportunity to have their concerns considered.

### **Funding for State Water Plan Development**

The amount of funds required to develop a state water management plan vary considerably by state depending on the nature of the planning process and the amount of related monitoring, analysis, and study that is required to develop the plan. In Georgia, where river basin management plans are currently being developed, sound science studies are underway for the coastal region and Southwest Georgia, and the multi-year study of the ACF and ACT river basin conducted in cooperation with Alabama, Florida and the U.S. Army Corps of Engineers, considerable data gathering and analysis has already occurred, which decreases the amount of funding necessary for the state planning process. In the two-tiered approach envisioned in this report (i.e., patterned after Kansas, Montana, Utah, and other states), the state water management plan is a policy document which may not be as dependent on data generation as the river basin and other management plans.

Funds are still necessary, however, for the planning agency to develop the state comprehensive water management plan. Such planning funds most commonly come from general revenues provided to the planning agency through the budget process. Kansas, which has a continuous water planning process, established a State Water Plan Fund, which receives money from the following sources:

- \$6 million/fiscal year from the state general fund;
- a three cent/1000 gallons of water tax imposed on water sold by public water suppliers, water appropriated for industrial use, and water appropriated for stock watering; and
- monies collected from penalties imposed for illegal disposal of sewage and solid and hazardous waste, and failure to obtain a public water supply permit.

In Georgia, funds for developing the state water management plan would most likely be requested by the Governor and made available by the General Assembly through the normal budget cycle.

Funding also depends on the other types of responsibilities assigned to the planning unit. If the planning unit is to provide technical assistance, data, and information to regional and local water planning bodies, than additional funds would be necessary for these purposes.

Plan Implementation and Updating

### **Plan Implementation and Updating**

Most state water planning legislation includes provisions for implementing the plan and for periodically updating it.

#### Implementing the Plan

Legislation mandating the development of a state water plan usually includes a description of the authority the department, board, or commission has to implement the provisions of the plan. For example, the Kansas legislature directs the Kansas Water Office to “adopt, amend, promulgate, and enforce such rules and regulations as are necessary and proper to carry out the provisions of this act” (§82a-923 ). Likewise, Montana’s water plan statute states that the Department of Natural Resources and Conservation “may adopt from time to time, as necessary or expedient, suitable rules for the administration of this chapter” (§85-1-201 ). The Hawaii statute establishes a Commission on Water Resource Management, which has “exclusive jurisdiction and final authority in all matters relating to implementation and administration of the state water code” (174C-7(a)). Conversely, the Oklahoma Water Resources Board is “not authorized to implement the [water] plan ... except by express authorization and consent of the Legislature” (82 §1086.2(1)). The Florida Water Implementation Rule states that the water plan will include implementation strategies for each water management goal and responsibility, along with methods for assessing program effectiveness and the Department of Environmental Protection’s progress toward implementation of the water plan (62 - 40.510(4)).

#### Updating the Plan

Some state water plans specify the time in which the development of the initial plan is to be completed. For example, the Hawaii statute states that the water plan is to be adopted by the Commission of Water Resource Management not later than three years from the effective date of the chapter (174C-32(c)). Oklahoma and Florida also include such provisions in their water plans (8 §1086.2(1), 62 - 40.510(3)). In addition, most of the states with comprehensive water management plans include specific time frames for plan updates. The period between updates

can differ substantially, however. For example, the Oklahoma statute provides for 10-year updates (8 §1086.1(A)), while Florida's water plan is updated every five years (62 - 40.510(4)), and the Kansas water plan is subject to annual review (§82A-906). States with longer plan update periods sometimes include statutory provisions directing the implementing agency to continue work on the plan in the periods between updates. Florida, for instance, requires that annual status reports be prepared by the Department of Environmental Protection (62 - 40.510(4)). Similarly, the Oklahoma statute states that, "work on subsequent updates shall remain continuous and ongoing throughout the ten-year period between submission of the updates" (8 §1086.2(1)).

Developing a comprehensive state water management plan is a significant measure in providing direction for Georgia's water management efforts. Currently nearly half the states in the country have already developed comprehensive state water management plans, are in the process of developing such plans, or are considering doing so. The experience of other states suggests that a two-tiered approach to water planning is most effective.

## **CONCLUSIONS**

With the increasing demands being placed on Georgia's water resources, both for instream uses and withdrawals for multiple purposes, and the increasing need to address contaminated runoff from land, as well as point discharges of pollutants, the management of water resources is becoming more complex. With this increased complexity is an increased need to comprehensively plan how to manage Georgia's water resources. Georgia is not alone in reaching this point. Currently, nearly half the states in the country have already developed comprehensive state water management plans, are in the process of developing such plans, or are considering doing so.

The lessons learned from the eight states with comprehensive water management plans in place provide guidance for Georgia.

- There are benefits to statewide comprehensive water resource planning.
- Comprehensive plans both communicate and shape state water policy.
- The East - West water planning difference is gone.
- State water planning efforts occur at both the state and sub-state levels.
- Different types of state water plans achieve different types of results.
- Roles and responsibilities are specified for those involved in the water planning process.
- Plans must be funded, implemented, and updated to benefit water resources.
- There is a nationwide trend toward comprehensive statewide water planning.

The experience of other states suggests that at the state level, a two-tiered approach to water planning is most effective. The comprehensive state water management plan serves as a policy document that presents the water vision, goals and objectives for the state in meeting its responsibility under the public trust doctrine to serve as a steward of the state's water resources for the people of the state. The comprehensive state water management plan thus sets the framework and provides the guidance for other state, regional and local water planning and management efforts.

To move forward on developing a comprehensive state water management plan, legislation will be required. Georgia legislation for this purpose would normally include the legislative intent, identify the lead agency for developing the plan, require interagency cooperation in developing the plan, identify planning criteria, and provide for public involvement. If the Governor and the General Assembly are interested in creating an overall water planning structure for the state, the legislation could encourage the creation, on a voluntary basis, of regional water districts and watershed management councils and set forth the structure and function of these sub-state water planning institutions. In addition, the legislation could direct how the lead water planning unit should interact with these local/regional councils (i.e., provision of data and information, technical assistance, etc).

## **APPENDIX A**

### **SUMMARIES OF STATE COMPREHENSIVE WATER PLANNING APPROACHES**

To better understand comprehensive state water planning approaches, the following summaries provide an overview of both the enabling legislation and the comprehensive water planning process for each of the eight states with comprehensive plans.

#### Florida

Florida's water management approach differs from most states in that it depends heavily on five semi-autonomous water management districts. The need for a comprehensive state plan relates to the importance of coordinating state responsibilities with those of the water management districts.

#### *Summary of Supporting Legislation*

In 1972, the Florida legislature passed the Florida Water Resources Act (72-299). This act directed the Department of Natural Resources to study:

- the existing water resources in the state;
- means and methods of conserving and augmenting such waters;
- existing and contemplated needs and uses of water for protection and procreation of fish and wildlife;
- irrigation;
- mining;
- power development and domestic, municipal, and industrial uses; and
- all other related subjects including drainage, reclamation, flood-plain or flood-hazard area zoning, and selection of reservoir sites (§6(1)).

The intent of the comprehensive state plan was to integrate and coordinate the use and development of the waters of the state based on the above studies (§6(1)). The policy considerations behind the act included:

- providing for the management of water and related land resources;
- promotion of conservation, development, and proper use of surface and ground water;
- development and regulation of dams, and other works and provision of water storage for beneficial purposes;
- prevention of damage caused by floods, soil erosion, and excessive drainage;
- preservation of natural resources, fish, and wildlife; promotion of recreational development and protection of public lands; and
- promotion of the health, safety, and general welfare of the people (§2(2)).

In 1997, the act was significantly amended. Policy considerations were broadened to include cumulative impacts on water resources and sustainable water management. The department was directed to promote the replenishment, recapture, and enhancement of surface

and ground water and the availability of sufficient water for all existing and future reasonable-beneficial uses and natural systems (ch. 97-160, §1). The act mandated the development of district water management plans for water resources within each water management district.

In 1998, the legislature added to the act a provision directing the department and the water management districts to encourage the use of water from sources nearest the area of use or application whenever practicable (ch. 98-88, §1).

### *Summary of Planning Efforts*

The 1995 Florida Water Plan, prepared jointly by the Department of Environmental Protection and the five regional water management districts, integrates the state Water Use Plan, state water quality standards, and the 1994 District Water Management Plans that guide regional water resource management efforts. The comprehensive plan provides statewide and regional water management goals, priority issues, action steps, and schedules to implement water management responsibilities.

The overall goal of the Florida Water Plan is to ensure long-term sustainability of the state's water resources for the benefit of the state's economy, natural systems, and quality of life. Sixteen priority issues are identified in six categories:

- general issues,
- water supply,
- flood protection and floodplain management,
- water quality,
- natural systems, and
- coordination and evaluation.

For each issue area, the relevant goals are based on policies statements contained in Florida statutes. In order to effect the goals, the plan's objectives include:

- provide protection and management in the following areas,
  - > flood,
  - > water quality,
  - > natural systems, and
  - > water supply;
- promote surface and ground water,
  - > conservation,
  - > replenishment,
  - > recapture,
  - > enhancement,
  - > development, and
  - > proper utilization;
- develop works to provide water storage;
- promote the availability of existing water for all future and existing uses and natural systems;

- minimize degradation caused by stormwater discharge;
- preserve natural resources;
- promote recreational development; and
- protect public lands.

The plan is intended to guide future actions of the Department of Environmental Protection and the water management districts but its strategies are not binding unless adopted as administrative rule. The plan is developed using a sub-state to state approach. Each water management district governing board develops a district water management plan for water resources within its region. The district plans, based on a 20-year planning horizon, are submitted to the department for approval. The department then formulates the Florida Water Plan, which includes the department's water quality standards, the district plans, and all other water related activities of the department and the districts including the water resource implementation rule (ch. 97-160, §7).

The Florida Water Plan serves as an important administrative tool to help achieve close coordination, integration, and mutual support between water resource management programs at all levels. The plan strives to implement its policies through integration of a variety of planning, acquisition, operational, regulatory, and outreach approaches. It must include linkages to the Department of Environmental Protection's budget and provide strategies to identify the amount and sources of supplemental funding to implement the plan. The district and state plans are revised on a 5-year cycle; published revisions are expected by the end of 2000. An annual progress report is released to provide a status update on implementation of the Florida Water Plan and to support agency accountability.

## Hawaii

Although Hawaii is unique among states due to its location and geography, it is struggling with many of the same water challenges as other states. Consequently, from a policy perspective, Hawaii's efforts may be instructive.

### *Summary of Supporting Legislation*

The Hawaii Water Plan legislation has not been significantly amended since its enactment in 1987. It mandates the implementation and use of comprehensive water resources planning in the regulation and management of the state's water resources. The water code requires the development and update of a Hawaii Water Plan to guide the Commission on Water Resources Management in its responsibilities and duties to implement federal and state regulations and policies that assure:

- economic development,
- good municipal services,
- agricultural stability, and
- water resource protection (174c - 2 (b)(c)).

### *Summary of Planning Efforts*

The initial Hawaii Water Plan, prepared by multiple state and county agencies, was adopted in 1990. The plan is designed so that all water resource development options planned by federal, state, or county agencies can be integrated at the county level. Objectives of the plan include:

- attainment of maximum, reasonable-beneficial use of water;
- water conservation and development;
- attainment of adequate water quality; and
- flood control.

The Hawaii Water Plan consists of five components or sub-plans that comprise Hawaii's approach to establishing a comprehensive water resource management plan:

- Water Resource Protection Plan,
- Water Quality Plan,
- State Water Projects Plan,
- Agricultural Water Use and Development Plan, and
- County Water Use and Development Plans.

The Water Resource Protection Plan and Water Quality Plan outline the regulations, standards, and resource availability and the quality of the state's water resources, respectively. They provide critical information for compilation of the remaining three plans. A county water use and development plan is prepared by each of the counties.

Hawaii released a Statewide Framework for Updating the Hawaii Water Plan in February 2000. It incorporates the techniques of Integrated Resources Planning to provide focus and guidance to each agency responsible for updating specific elements of the plan. Integrated Resources Planning involves least-cost analysis of resource management options (i.e., direct and indirect costs and benefits of demand-side and supply-side alternatives), while considering multiple planning objectives or competing policy goals, and including community participation in the planning, decision-making, and implementation processes. It is an approach that provides decision-makers with the framework and information necessary to make difficult trade-offs (Hawaii Water Plan, 2000).

In implementing the framework, Hawaii intends to update its statewide comprehensive plan so that it:

- eliminates fragmented efforts,
- is responsive to future regulation and water availability uncertainties through the development of alternative strategies,
- explicitly addresses trade-offs between competing users, and
- considers a range of physical, environmental and socioeconomic scenarios in calculating resource development strategies.

The framework outlines the objectives for updating the statewide Hawaii Water Plan and discusses the integrated approach, the relationships between the plan components, elements of an integrated resource planning process, and the need for integration of resource strategies at the county level. It identifies the minimum requirements for each plan component and recommends the elements that should be included to comprise an integrated resource planning approach. In addition, the framework describes the role and responsibility of the agencies charged with updating the plan and provides a schedule and implementation plan for its update.

The Hawaii plan is similar to the Florida plan in having a two-tiered approach. In Florida, the two levels are the state and the water management districts while in Hawaii they are the state and the counties.

### Kansas

Kansas differs from Florida and Hawaii in many ways but like them, it found it advantageous to plan comprehensively for the management of its water resources.

#### *Summary of Supporting Legislation*

An act providing for a Kansas state water plan was first passed in 1963, in which the legislature expressed a concern that “limited, valuable, and irreplaceable reservoir sites” were being underdeveloped. In addition, the legislature felt that lack of state financial participation relative to flood prevention and water conservation projects was resulting in an underdevelopment of general water control programs. The act stated that the people of Kansas could best achieve proper use and control of state water resources through development of a well balanced, coordinated, and comprehensive state water resources policy and plan through which the various public and private water activities within the state would be effectively directed, developed, and coordinated (ch. 514, §1). The state water plan originally encompassed four policies of the state:

1. to assist in the development of water conservation storage in reservoir projects in order to assure adequate management of limited state water resources and to provide sufficient, reliable water supplies for present and future use within the state;
2. to assist public corporations in developing flood control and water conservation projects;
3. to encourage, promote, and secure the maximum beneficial use, control, and development of water resources; and
4. to encourage reasonable payment from the persons receiving direct benefits deriving from the plan (ch. 514, §1).

Current policy language states that Kansas can best achieve the proper use and control of state water resources through comprehensive planning which coordinates and provides guidance for the management, conservation, and development of the state’s water resources (§82a-901a).

The original legislation listed 17 considerations that the implementing agency was to use while formulating the plan. These considerations have been amended and modified through the years but remain largely intact and include such issues as:

- the management, conservation, and development of Kansas’s water resources for the benefit of the state as a whole (“management, conservation” replaces the language of the original statute which called for “maximum economic” development) (ch. 398, §7);
- the public health and general welfare of the people of the state;
- safeguards to aquatic and animal life;
- water development policies, consistent with the beneficial development of other natural resources;
- all appropriation and other rights to the use of water;
- the interrelationship of groundwater and surface water supplies;
- the use of waters to augment the flow of surface streams; and
- the inclusion of conservation storage in reservoir development and planning for the regulation of stream flow for the purpose of quality control (§82a-907).

A 1965 amendment to the legislation added a list of 17 polices that were to serve as guides for all state agencies with respect to the water resources of the state (ch. 558, §2). This list was significantly amended in 1981 when 12 of the 17 polices were removed and replaced with 12 new policies (ch. 398, §10). This list was subsequently modified in 1986 and 1987, when a policy of encouragement of the use of agricultural soil and water conservation practices was added (ch. 394, §3, ch. 402; §3).

### *Summary of Planning Efforts*

The first comprehensive Kansas Water Plan was approved in 1984. Legislation to implement proposals contained in the plan was submitted in 1985 at which time 12 Basin Advisory Committees were also formed to advise the Kansas Water Office and Kansas Water Authority on local water issues.

The Kansas Water Plan 2000 provides policy recommendations and administrative guidelines in nine broad categories:

- public water supply;
- water conservation;
- water right management;
- water quality;
- flood management;
- wetland and riparian management;
- water based recreation;
- data and research; and
- public information and education.

Objectives are established for each of the policy categories, which guide future major policy decisions by aiding state policy revisions and budget allocations.

The Kansas Water Plan 2000 includes a section for each of the 12 river basins that emphasize geographic-based planning and implementation but may also address the nine policy categories. The purpose of the basin sections is to identify priority problems and to make

recommendations for the operation of state programs in the basin in order to resolve them. The Basin Advisory Committees provide recommendations on the formulation and implementation of the basin sections, which are considered part of the state's annual planning process.

Numerous public and private entities, and the general public, are also involved the preparation of the plan. Together with the Annual Implementation Plan, the Kansas Water Plan addresses the spectrum of water-related programs of various state agencies. Program outcomes are evaluated and used, in conjunction with an analysis of the condition of the state's water resources, to annually revise the plan in a continuous planning process.

Like Florida and Hawaii, Kansas has adopted a two-tiered approach to state water planning which includes the statewide plan that presents state policies and river basin management plans for the management of the water resources within each basin.

### Missouri

Missouri's comprehensive state water planning history is not as extensive as Florida, Hawaii, or Kansas. Although the authorizing legislation was enacted over a decade ago, Missouri is still in the process of developing its first comprehensive plan.

#### *Summary of Supporting Legislation*

Missouri's legislation mandating the development of a state water resource plan has not been amended since its original passage in 1989. The statute requires the Department of Natural Resources to develop, maintain, and periodically update a comprehensive statewide water resource management plan. The department is to collect data, make surveys, conduct investigations, and provide recommendations concerning the water resources of the state as related to its social, economic, and environmental needs (9§640.415).

#### *Summary of Planning Efforts*

The Department of Natural Resources is completing its task of developing the State Water Plan in two phases. The nearly completed Phase I is a series of technical documents that provide basic information on:

- surface and ground water resources and use,
- water quality,
- interstate water issues,
- hydrologic extremes, and
- water law.

The Phase I technical documents will support public participation, issue identification, needs assessment, and future planning at multiple levels including Phase II, which will identify problems and opportunities on a regional level resulting in six regional water resources reports.

The Department of Natural Resources is directed, as lead agency, to establish an interagency task force consisting of any and all departments and agencies, including the University of Missouri, that are necessary to effectuate the purposes of the plan (§640.430). The department also must submit a report specifying major components of the plan to the general assembly at least one year prior to the submission of the State Water Plan. The plan must include development of programs for existing and future demands including:

- drinking water supplies,
- agriculture,
- industry,
- recreation, and
- environmental protection.

Missouri, like the other states discussed, envisions a two-tiered approach to water planning. Similarly, like many other states Missouri is confronted with the need for studies to support planning and policy decisions. Consequently, the time frame for developing the plan has been quite long.

### Montana

Unlike Florida and Hawaii, Montana is a sparsely populated state but, like them, it found developing a comprehensive state water management plan to be advantageous.

#### *Summary of Supporting Legislation*

Legislation calling for the creation of a State Water Plan was first formulated in the Montana Water Resources Act of 1967 (1967 Mont. Laws 158). This statute set forth the policy considerations behind the creation of the State Water Plan and authorized the Montana Water Resources Board to gather necessary information and prepare a comprehensive water resource inventory. The plan was to be formulated in sections corresponding with the hydrologic divisions of the state (§§2, 5). Although the statute has been amended several times since it was originally enacted, none of the resulting changes has significantly altered it. The Department of Natural Resources and Conservation was given the duty to formulate the water plan in 1974, and in 1995, the statute was altered to require the department to submit the state water plan to comment to the Environmental Quality Council, a bi-partisan legislative committee, as well as to the state legislature for approval (ch. 253, §119, ch. 545, §70).

#### *Summary of Planning Efforts*

The State of Montana uses a two-tiered (statewide and river basin) issues-driven approach to develop the State Water Plan, an evolving document that will result in a comprehensive water resources management plan. The 1967 Water Resource Act directed the Department of Natural Resources and Conservation to develop a State Water Plan that conserves, develops, and provides for multiple use of the state's water. For many years, efforts to develop the plan focused on basin plans, which produced volumes of technical information but failed to consider the institutional and political feasibility of implementing recommendations and

consequently had little affect on water management decisions. In addition, the basin plans did not address critical statewide issues such as interstate allocation, reserved water rights, instream flow protection, etc.

In 1987, the Department of Natural Resources and Conservation began a continuous state water planning process similar to the approach used in Kansas. The planning process serves as a flexible forum for collaborative consensus-based problem-solving and more effective water policy-making. The intent of the State Water Plan is to promote the conservation, development, and beneficial use of the state's water resources to secure maximum economic and social prosperity for Montana's citizens. The plan must set out a progressive program to meet these goals and propose the most effective means by which water resources may be applied giving due consideration to alternative uses and combinations of uses.

While this planning process initially focused on statewide issues, in 1995 the spatial scale was refined to begin to also address problems in the state's 15 river basins. The first phase in the five-phase planning process involves identification and selection of high priority issues including those relative to water supply, water quality, and fish, wildlife, and recreation. The process then develops sound technical information, policies, and management actions to address the issues. The State Water Plan Advisory Council, a governor appointed decision-making body, solicits water management concerns from water users, resource managers, researchers, and the public. Once identified and selected, Technical Advisory Committees (for statewide issues) or Citizen Advisory Committees (for basin-specific issues) analyze the problems, develop options, and recommend actions.

The plan sections are referred to as management sections when they focus on statewide issues and basin sections when they address basin specific concerns. Each section includes background information and a policy(s) statement, issues and recommendations, and implementation aspects including legislative and administrative actions, funding strategies, and a time schedule. The plan sections address the issues of:

- ground water management,
- integrated water quality and quantity management,
- drought management,
- water information system,
- instream flow protection,
- federal hydropower licensing and state water rights,
- agricultural water use efficiency, and
- water storage.

Together, the sections, which are supported by a variety of technical documents, comprise the State Water Plan. As the plan recommendations are set in motion, the results are monitored and evaluated to measure success and the plan is revised as needed.

Montana, like the other states, has adopted a two-tiered approach with the statewide plan addressing statewide policy issues and resource plans managing specific water resources.

## Nevada

Nevada is the driest state in the nation, averaging about nine inches of precipitation per year. Consequently, it is not surprising that Nevada would develop a comprehensive state water management approach to plan for the use and protection of its scarce water resources.

### *Summary of Supporting Legislation*

The water policy for Nevada was set forth in a 1977 legislative declaration which stated that, as much of the state's surface and ground water resources were committed to existing uses, it was the policy of the state to encourage efficient and non-wasteful use of these limited supplies. In addition, the legislature recognized the relationship between the critical nature of Nevada's limited water resources and the increasing demands placed on these resources as the state's population continued to grow (ch. 529, §160). In 1991, the legislature also acknowledged the relationship between the quantity and quality of water and the necessity to consider both factors simultaneously in water use planning (ch. 103, §1). In 1995, the legislature added provisions for water resource planning in order to assist state and local governments and citizens in developing effective plans for the use of water, based on the identification of current and future water needs (ch. 641, §1). To fulfill these ends, the Nevada Legislature charged the Division of Water Planning in the state Department of Conservation and Natural Resources with the duty of providing information, alternatives, and recommendations bearing on regional shortages of water including feasible selections or courses of planning and action for acquiring additional water or for conserving water currently available. A 1987 amendment added water conservation to the list of new sources of water the division was to investigate (ch. 815, §30).

### *Summary of Planning Efforts*

Nevada engaged in an effort that spanned four and one-half years to develop both a comprehensive statewide water resources planning process and the 1999 Nevada State Water Plan. The purpose of the plan is to assist the state and local governments and the public in developing effective plans for the use of water. The plan provides general information about the state's water quantity, water quality, and use. The current water plan deviates from the last plan, released in 1974, by:

- considering a wider array of water uses,
- developing a model to forecast future water needs,
- identifying critical water resource issues,
- providing recommendations for addressing these issues, and
- making institutional commitments to implement those recommendations.

The 1999 Nevada State Water Plan addresses a broad range of issues in an interdisciplinary and integrated way. It assesses water quantity and quality and identifies constraints and opportunities that impact water resource decision-making. The plan components include:

- guiding principles for the plan and planning goals;
- an institutional, socioeconomic, and water resources assessment;
- water use and forecasts to the year 2020;
- water management issues such as water supply and allocation, water quality, resource conservation, recreational uses, flood management, watershed planning, and data management; and
- appendices of water use and forecast data and county level data.

The plan is considered a policy and planning guide; it does not change existing water law or affect existing water rights. It is the policy of the state that water supply planning is best determined and implemented at the local level. However, the plan provides resource data and identifies water management issues and it recommends policy directions and actions that are designed to assist water managers at all levels of government and to help reach consensus on future water management strategies. The 1999 Nevada State Water Plan was developed by the Nevada Division of Water Planning with assistance from a 15-member Advisory Board on Water Resource Planning, the Department of Conservation and Natural Resources Steering Committee, local, state, and federal agencies, and the public.

Like the other states, Nevada's water planning approach is two-tiered in nature, with a statewide policy document and local water management plans.

### Oklahoma

Oklahoma is in a similar situation to other midwestern states (i.e., Kansas and Missouri), which identified a need to comprehensively plan for their water resources.

#### *Summary of Supporting Legislation*

Oklahoma passed legislation mandating development of a state water plan in 1974. At that time, the Oklahoma legislature stated that the people of Oklahoma had a primary interest in the orderly and coordinated control, protection, conservation, development, and utilization of the appropriative water resources of the state (ch. 25, §1). The current version of the act encompasses all the water of the state, not only the appropriative waters (82 §1086.1(A)). The 1992 amendments added provisions for 10-year updates of the plan. These amendments also added provisions mandating continuous, ongoing work on subsequent updates of the plan between submissions (ch. 48, §1). The original version of the statute stated that the purpose of the act was to provide means for the expeditious and coordinated preparation of a comprehensive state water plan, which should contain a feasibility and cost study on the individual projects included within the plan and on the state plan itself. The plan was also to provide for the acquisition, development, and use of storage and transportation facilities for the excess and surplus appropriative water of Oklahoma (ch. 25, §1). The current version of the statute states that the plan's purpose is to provide for the management, protection, conservation, structural and nonstructural development, and use of Oklahoma's water resources (§1086.1(A)).

### *Summary of Planning Efforts*

Oklahoma has been undertaking a comprehensive statewide approach to water resource management planning since 1980 when the first Oklahoma Comprehensive Water Plan was developed. The primary objective of the plan is to pursue water resource management solutions from a policy perspective, focusing on:

- need assessment,
- identification of problem areas and opportunities,
- establishment of objectives, and
- recommendations on specific policy initiatives to achieve desired goals.

The plan was first updated in 1995 and addressed 11 water resource policy categories:

- water rights,
- water quality,
- water and wastewater systems,
- reservoir operations,
- water marketing,
- water supply augmentation,
- water conservation,
- water resource planning,
- floodplain management,
- problem mediation and arbitration, and
- data collection and management.

The Water Resources Board established eight functional planning regions in the state that share common characteristics such as homogeneity of climate, geography, hydrology, economics and demography and have unique water resources and requirements. The board prepared the state water plan to address the following specific objectives at the planning region level:

- promotion of economic opportunity and development;
- preservation and enhancement of the environment;
- flood protection;
- expansion of agricultural production and agribusiness activity;
- development of recreational opportunities;
- maintenance and improvement of water quality;
- encouragement of water conservation;
- placement of excess and surplus water to beneficial use; and
- encouragement of public participation in water resource planning.

The next Oklahoma Comprehensive Water Plan update is anticipated in 2005.

As with the other states discussed, Oklahoma has adopted a two-tiered approach to water planning with a statewide water plan presenting state policies and regional plans to address water management challenges within those regions.

## Utah

Utah, like Nevada, is an arid state with a growing population and expanding demands for water. Consequently, Utah's policy makers identified the need to comprehensively plan for how the water resources of the state would be managed.

### *Summary of Supporting Legislation*

The legislative language directing the formulation of a Utah State Water Plan has remained unchanged since it was first enacted in 1963 (1963 Utah Laws 178). The water policy behind the state water plan stresses that water should be saved from waste and put to the highest beneficial use for the public welfare (§73-10-1(2)). This language was derived from legislation dating from the turn of the century (1903 Utah Laws 100). The current version of the statute reiterates that Utah water policy is to obtain from state water the highest duty for domestic uses and irrigation of lands in Utah (§73-10-1(1)).

### *Summary of Planning Efforts*

Although the initial concept of a state water plan was adopted in 1963, the process did not begin to take shape until additional legislation was passed in 1984 and 1985. In 1987, when Utah began developing its current State Water Plan, it chose to duplicate the comprehensive statewide water resources management planning process established by Kansas. The State Water Plan is an ongoing process to establish and implement Utah's water management policy goal: to provide water to meet the changing needs of present and future generations. The plan gives direction for moving water supplies to areas of demand while encouraging developers and users to be good stewards of the state's natural resources. The plan acts as a flexible framework which could accommodate changes in conditions, needs, information, and problems.

Utah's statewide comprehensive water plan was finished in 1990 and 11 basin plans were completed in 2000, each taking approximately 18 months to develop. The state plan, revised on a 10 – 15 year cycle, addresses the physical, social, and environmental dimensions of water use. It presents sections that cover all aspects of Utah's water resources:

- demographics and economics;
- water supply and use;
- management of water rights and availability;
- regulation and institutional considerations, state and federal water resources funding programs;
- water planning and development;
- agricultural water conservation and development;
- drinking water supplies, development and management;
- water pollution control;
- disaster, and emergency response;
- flood control and drought response;
- fisheries and water-related wildlife;
- recreation, federal water planning and development;

- industrial water use;
- ground water; and
- river basin summaries.

The basin plans, drafted by Basin Planning Advisory Groups, evaluate existing water resources, assess future needs, determine water-related issues, and recommend how and by whom the issues can be resolved.

The Division of Water Resources writes the initial draft plan and provides it to a State Coordinating Committee comprised of representatives of 11 water-related state agencies for review and comment. The revised plan is then provided to Local Advisory Groups that represent various stakeholders for review and comment. The draft plan is released for comment in public hearings. At each step of the process, the draft plan is reviewed and approved by the Division of Water Resources Board. The Division of Water Resources, one of seven agencies of the Utah Department of Natural Resources, is nonregulatory and conducts loan programs and conservation education in addition to planning and oversees the required local government water plans.

Utah, like the other states discussed, has adopted a two-tiered approach to water planning. It patterned its planning process after that of Kansas, using both the statewide plan to put forth statewide policies and river basin plans for managing the water resources within each basin.

## REFERENCES

### General

- Association County Commissioners of Georgia and the Georgia Municipal Association. Georgia Water Resource Policy: A Call for Action. 1999.
- Bagwell, T, and M. Personett. "State and Regional Water Planning in Texas." Journal of the American Water Works Association. Vol. 89, Num 11. November 1997: pp. 65-72.
- Draper, Stephen E. 2000. Water Policy in Georgia (unpublished).
- Jackson, Turrentine, W, and Donald J. Pisani. 1983. Evolution of California State Water Planning: 1850-1928. Water Resources Center, University of California, Davis.
- Kundell, James E. and Diana Tetens. 1998. Whose Water Is It? Major Water Allocation Issues Facing Georgia, Carl Vinson Institute of Government, The University of Georgia, Athens.
- Les K. Lampe, 1983. "Water Resources Planning and Management in Kansas," in Regional and State Water Resources Planning and Management, R.J. Charbeneau and B. P. Popkin (ed), American Water Resources Association, Bethesda, Md.
- McKinney, Matthew J. "State Water Planning: A Forum for Proactively Resolving Water Policy Disputes." The Water Resources Bulletin of the American Water Resources Association. Vol. 26, Num 2. April 1990: 323 - 31.
- Miller, Susan M, William L. Powers, and Dayle E. Williamson. 1983. "The Changing Role of Natural Resource Departments in the Missouri River Basin States," in Regional and State Water Resources Planning and Management, R.J. Charbeneau and B. P. Popkin (ed), American Water Resources Association, Bethesda, Md.
- Morandi, Larry. 2000. Coordinated Planning For Water and Land-Use: Is It Worth Considering? Paper presented at the June 6-9, 2000 National Conference of State Legislatures. Denver.
- Rice, Patrick W., Ronald L. Woodburn, and Fred Baatz. 1983. "The Effect of Water Supply and Management on the Economy of South Dakota," in Regional and State Water Resources Planning and Management, R.J. Charbeneau and B. P. Popkin (ed), American Water Resources Association, Bethesda, Md.

### States

#### Alaska

- Alaska Clean Water Action Plan (ACWA Plan), Draft. September 1, 2000.
- Braley, Susan, Alaska Department of Environmental Conservation, Division of Air and Water Quality, personal communication, September 12, 2000.

#### Arizona

- Arizona Department of Water Resources, (<http://www.adwr.state.az.us/AZWaterInfo>), June 20, 2000.
- Sundie, Dennis, Section Manager, Water Resources Planning, personal communication, July 17, 2000.

## Arkansas

- Arkansas Soil and Water Conservation Commission, Arkansas State Water Plan, (<http://www.state.ar.us/aswcc/page16.html>), June 14, 2000.
- Arkansas Soil and Water Conservation Commission. 1990. Arkansas State Water Plan, Executive Summary.
- Smith, Earl, Arkansas Soil and Water Conservation Commission, Water Management, personal communication, July 13, 2000.

## California

- CALFED Bay-Delta Program, (<http://www.calfed.water.ca.gov/general/overview.html>), August 18, 2000.
- California Department of Water Resources. 1998. The California Water Plan Update: Executive Summary, Bulletin 160-98.
- California Department of Water Resources. 1998. The California Water Plan Update: Volume 1, Bulletin 160-98.
- California Department of Water Resources. 1998. The California Water Plan Update: Volume 2, Bulletin 160-98.
- California State Water Resources Control Board and the Regional Water Quality Control Boards Strategic Plan, July 1997, (<http://www.swrcb.ca.gov/general/publications/strategc.htm>), August 18, 2000.
- California Water Commission, California Department of Water Resources, (<http://www.water.ca.gov/CAWaterCommission/>), August 18, 2000.
- The California Water Plan, 1959 Cal. Stat. 2053, §§10004, 10005.
- Cal. Water Code §10000 (West 1956 & 1977 Supp.).
- Colorado River Board of California, (<http://crb.water.ca.gov/>), August 18, 2000.
- Dabbs, Paul, California Department of Water Resources, personal communication, July 17, 2000.
- Overview of Water Quality Programs, (<http://swrcb.ca.gov/general/about/index.html>), August 18, 2000.

## Colorado

- 1953 Colo. Sess. Laws 245, §§1, 3.
- 1967 Colo. Sess. Laws 194, §6.
- Colorado Water Quality Control Division and Commission. 1998. Colorado Water Quality Management and Drinking Water Protection Handbook. Commission Policy #98-2.
- Substitute Water Supply Plan Guidelines, (<http://water.state.co.us/tssp.htm>), July 14, 2000.

## Connecticut

- Bannick, Fred, Connecticut Department of Environmental Protection, Planning and Standards, personal communication, July 14, 2000.
- Bureau of Water Management, Programs and Activities, (<http://dep.state.ct.us/wtr/div/divrptsum.htm>), July 14, 2000.

State Water Allocation Policies Report, Connecticut Department of Environmental Protection, (<http://dep.state.ct.us/wtr/div/divrptsum.htm>), July 14, 2000.

### Delaware

Schneider, John, Environmental Program Manager, Delaware Department of Natural Resources and Environmental control, Division of Water Resources, Watershed Assessment Section, personal communication, September 1, 2000.

### Florida

Florida Department of Environmental Protection Office of Water Policy. 2000. Florida Water Plan: 1999 Annual Progress Report.

1997 Fla. Laws 97-160, §§1, 7.

1998 Fla. Laws 98-88, §1.

FLA. STAT. ANN. §373.016 (Harrison 2000).

FLA. STAT. ANN. §373.036 (Harrison 2000).

Florida Water Plan, 1995,

([http://www.dep.state.fl.us/water/division/waterpol/fl\\_water\\_plan/wpfpw.htm](http://www.dep.state.fl.us/water/division/waterpol/fl_water_plan/wpfpw.htm)), August 11, 2000.

Florida Water Resources Act of 1972, Fla. Laws 72-299, §§2, 6.

Florida Water Rule, FLA. ADMIN. CODE ANN. r. 62 - 40.510.

Thomas, Arnetria, Florida Department of Environmental Protection Water Resource

Management Division, Office of Water Policy, personal communication, July 13, 2000.

### Georgia

GA. CODE ANN. §12-5-21 (1996).

GA. CODE ANN. §12-5-23 (1996).

GA. CODE ANN. §12-5-401 (1996).

GA. CODE ANN. §12-5-402 (1996).

GA. CODE ANN. §12-5-441 (18) (1996 & Supp. 2000).

GA. CODE ANN. §12-5-442 (1996 & Supp. 2000).

GA. CODE ANN. §12-5-443 (1996 & Supp. 2000).

GA. CODE ANN. §12-5-521 (1996).

GA. CODE ANN. §12-5-522 (1996).

GA. CODE ANN. §12-5-523 (1996).

GA. CODE ANN. §12-5-524 (1996).

1973 Ga. Laws 128, §§3, 4.

1975 Ga. Laws 837, §3.

1977 Ga. Laws 368; §§1, 2.

1989 Ga. Laws 1641, §8.

1989 Ga. Laws 1317, §6.6.

1992 Ga. Laws 1896, §1.

Georgia Waterways Commission Established, No. 98, 1953 Ga. Laws 67.

Georgia Water Quality Act, No. 491, §§2, 4, 1957 Ga. Laws 629, 630-1.

## Hawaii

HAW. REV. STAT. 174C-2 (Michie 1997).  
HAW. REV. STAT. 174C-5 (Michie 1997).  
HAW. REV. STAT. 174C-7 (Michie 1997).  
HAW. REV. STAT. 174C-31 (Michie 1997 & Supp. 2000).  
HAW. REV. STAT. 174C-32 (Michie 1997).  
1988 Haw. Sess. Laws 276, §1.  
1991 Haw. Sess. Laws 325, §6.  
1998 Haw. Sess. Laws 101, §1.  
Hawaii Water Plan, 1987 Haw. Sess. Laws 45, §31.  
Statewide Framework For Updating the Hawaii Water Plan,  
(<http://www.state.hi.us/dlnr/cwrm/hwplan/hwframe.htm>), July 17, 2000.

## Idaho

Graham, Bill, Department of Water Resources, personal communication, July 17, 2000.  
State Water Plan, (<http://www.idwr.state.id.us/planpol/watplan/planning/existing.htm>), August 30, 2000.

## Illinois

The Changing Illinois Environment: Critical Trends, Background,  
(<http://dnr.state.il.us/orep/inrin/ctap/ctapvol2/pp17-12.htm>), June 21, 2000.  
The Changing Illinois Environment: Critical Trends, Volume Summary,  
(<http://dnr.state.il.us/orep/inrin/ctap/ctapvol2/pp1-6.htm>), June 21, 2000.  
Clark, Gary, Department of Natural Resources, Division of Water Resources, personal communication, August 7, 2000.  
Conservation 2000, (<http://dnr.state.il.us/orep/c2000/index.htm>), June 21, 2000.  
Frevort, Toby, Bureau of Water, Environmental Protection Agency, personal communication August 7, 2000.  
Illinois River Strategy Team, Illinois River Planning Committee. 1997. Integrated Management Plan for the Illinois River Watershed.  
Targeted Watershed Approach: Introduction, (<http://www.epa.state.il.us/water/targeted-watershed/introduction.html>), June 21, 2000.

## Indiana

Clark, Dennis, Section Chief, Office of Water Management, Department of Environmental Management, personal communication, July 17, 2000.

## Iowa

The 1996 Iowa State Water Plan, (<http://www.profiles.iastate.edu/resources/waterplan/plan/>), June 14, 2000.

## Kansas

1981 Kan. Sess. Laws 398, §§1, 3, 6, 7, 9, 10.  
1986 Kan. Sess. Laws 392, §4.  
1986 Kan. Sess. Laws 394, §§1, 3.  
1987 Kan. Sess. Laws 402, §3.  
KAN. STAT. ANN. §82a-901a (1989).  
KAN. STAT. ANN. §82a-903 (1989).  
KAN. STAT. ANN. §82a-905 (1989).  
KAN. STAT. ANN. §82a-906 (1989).  
KAN. STAT. ANN. §82a-907 (1989).  
KAN. STAT. ANN. §82a-923 (1989).  
KAN. STAT. ANN. §82a-927 (1989).  
KAN. STAT. ANN. §82a-928 (1989).  
KAN. STAT. ANN. §82a-951 (1989).  
KAN. STAT. ANN. §82a-952 (1989).  
Kansas Water Plan 2000, (<http://www.kwo.org/kwp/main.html>), July 17, 2000.  
State Water Plan, 1963 Kan. Sess. Laws 514, §§1, 4.  
State Water Plan, 1965 Kan. Sess. Laws 558, §§1, 2.

## Kentucky

Anness, Kent, Water Resource Development Commission, personal communication, July 14, 2000.  
Water Resource Development Commission: Strategic Planning Process and Water Resources Plan Development, (<http://kymartian.state.ky.us/wrdc/flow.htm>), June 15, 2000.

## Louisiana

Demond, John, Department of Environmental Quality, personal communication, July 17, 2000.  
Hindrick, Al, Department of Environmental Quality, personal communication, August 18, 2000.  
Louisiana Department of Environmental Quality: Strategic Plan FY1998-2003, (<http://www.deq.state.la.us/planning/strategic/1998/98intro.htm>), August 21, 2000.  
Office of Public Works and Intermodal Transportation: Public Works and Water Resources Division, ([http://www.dotd.state.la.us/water/direct\\_frm.html](http://www.dotd.state.la.us/water/direct_frm.html)), August 18, 2000.  
Office of Water Resources: Five-Year Strategic Plan, (<http://www.deq.state.la.us/planning/strategic/1998/980wr.htm>), June 26, 2000.  
Reengineered Strategic Planning Design: Specific Activity Procedures, (<http://www.deq.state.la.us/planning/strategic/splanprocedures.htm>), August 21, 2000.

## Maine

Horsley & Witten, Inc., Water Use Management Plan, Pleasant River, Downeast Maine, 1999.  
Maine Environmental Priorities Council, (<http://janus.state.me.us/dep/mepc/>), August 8, 2000.  
Margerum, Mark, Department of Environmental Protection, Bureau of Land and Water Quality, personal communication, August 8, 2000.

Watershed Management and the Department of Environmental Protection,  
(<http://janus.state.me.us/dep/blwq/docwatershed/depwm.htm>), August 8, 2000.  
Watershed Planning and Management, Bureau of Land and Water Quality,  
(<http://janus.state.me.us/dep/blwq/watersh.htm>), August 8, 2000.

### Maryland

Bower, Dave, Deputy Water Management Administrator, personal communication, August 18, 2000.  
Maryland's Chesapeake Bay Tributary Nutrient Reduction Strategies,  
(<http://www.nde.state.md.us/environment/tribstrat.html>), August 21, 2000.  
Maryland's Final 1998 Clean Water Action Plan, (<http://www.dnr.state.md.us/cwap/>), June 15, 2000.  
Massicot, Paul, Department of Natural Resources, personal communication, July 17, 2000.  
MD. ANN. CODE art. 9, et seq. (1999).  
Water Supply, Sewerage, Solid Waste, and Pollution Control Planning and Funding, MD. REGS. CODE tit. 26, et seq. (1999).  
What's DNR: A Snapshot, (<http://www.dnr.state.md.us/All/whatsdnr.html>), August 21, 2000.

### Massachusetts

Department of Environmental Protection, Bureau of Municipal Facilities. 1996. Guide to Comprehensive Wastewater Management Planning.  
Gottfried, Andrew, Department of Environmental Protection, personal communication, June 26, 2000.  
Massachusetts Department of Environment, Bureau of Resource Protection,  
(<http://www.magnet.state.ma.us/dep/brp/aboutbrp.htm>), June 26, 2000.  
Proposed Outline for Revised Comprehensive Water Resources Management Planning Guidance (Draft). 2000.

### Michigan

Hullman, Diane, Engineering Section, Land and Water Management Division, Michigan Department of Environmental Quality, personal communication, July 14, 2000.  
Surface Water Quality and Land and Water Management Divisions, Michigan Department of Environmental Quality. 1997. A Strategic Environmental Quality monitoring Program for Michigan's Surface Waters, MI/DEQ/SWQ-96/152.  
Wycheck, Jack, Aquatic Biologist, Surface Water Quality Division, personal communication, July 18, 2000.

### Minnesota

Executive Order 99-15, Providing for a Water Management Unification Initiative,  
(<http://www.mnplan.state.mn.us/eqb/water/exor9915.html>), July 13, 2000.  
Lundberg, Marilyn, Director, Environmental Quality Board, Water Resources Committee, personal communication, July 13, 2000.

Minnesota Planning, Environmental Quality Board. 1999. Public Review Draft - Preparing for Minnesota Water Plan 2000.

Minnesota Planning, Environmental Quality Board. 1998. Soundings: A Minnesota Water Plan Assessment.

### Mississippi

Branch, Charles, Head of Mississippi Office of Land and Water Resources, personal communication, August 8, 2000

MISS. CODE ANN. §51-3-21 (1972).

Mississippi Water Resources Management Planning Council. 1995. Compendium to A Water Management Plan for the State of Mississippi.

Mississippi Water Resources Management Planning Council. 1995. Executive Summary: Mississippi Water Management Plan.

Mississippi Water Resources Management Planning Council. 1995. A Water Management Plan for the State of Mississippi.

### Missouri

Missouri Department of Natural Resources, State Water Plan,  
(<http://www.dnr.state.mo.us/dgls/wrp/swp.htm>), July 17, 2000.

Mo. ANN. STAT. §640.400(2) (West 2000).

Mo. ANN. STAT. §640.415 (West 2000).

Mo. ANN. STAT. §640.430 (West 2000).

### Montana

McLean, Mike, Department of Natural Resources and Conservation, Water Resources Division, personal communication, August 7, 2000.

MONT. CODE ANN. §5-16-101 (1999)

MONT. CODE ANN. §5-16-102 (1999).

MONT. CODE ANN. §85-1-101 (1999).

MONT. CODE ANN. §85-1-201 (1999).

MONT. CODE ANN. §85-1-203 (1999).

Montana Ground Water Plan, 1999, ([http://www.dnrc.state.mt.us/wrd/gw\\_plan.htm](http://www.dnrc.state.mt.us/wrd/gw_plan.htm)), July 17, 2000.

1974 Mont. Laws 253, §§119, 138.

1985 Mont. Laws 573, §18.

1995 Mont. Laws 418, §417.

1995 Mont. Laws 545, §70.

Montana Water Resources Act, 1967 Mont. Laws 158, §§2, 5.

Strategic Plan of the Montana Department of Natural Resources and Conservation, 1998.  
([http://www.dnrc.state.mt.us/strategic\\_plan.htm](http://www.dnrc.state.mt.us/strategic_plan.htm)), July 17, 2000.

Upper Clark Fork River Basin Steering Committee. 1994. Upper Clark Fork River Basin Water Management Plan.

Water Resources Division, Department of Natural Resources and Conservation. 1989. Montana Water Plan: Management Section, Subsection: Agricultural Water Use Efficiency.

Water Resources Division, Department of Natural Resources and Conservation. 1989. Montana Water Plan: Management Section, Subsection: Federal Hydropower Licensing and State Water Rights.

Water Resources Division, Department of Natural Resources and Conservation. 1989. Montana Water Plan: Management Section, Subsection: Instream Flow Protection.

Water Resources Division, Department of Natural Resources and Conservation. 1989. Montana Water Plan: Management Section, Subsection: Water Information System.

Water Resources Division, Department of Natural Resources and Conservation. 1990. Montana Water Plan Section: Drought Management.

Water Resources Division, Department of Natural Resources and Conservation. 1992. Montana Water Plan Section: Integrated Water Quality and Quantity Management.

Water Resources Division, Department of Natural Resources and Conservation. 1990. Montana Water Plan Section: Water Storage.

Water Resources Division, Department of Natural Resources and Conservation. 1993. Montana State Water Plan Handbook.

Water Resources Division, Department of Natural Resources and Conservation. 1993. State Water Plan Implementation Update.

Water Resources Division, Department of Natural Resources and Conservation. 1994. Montana Ground Water Plan, Draft.

Water Resources Division, Department of Natural Resources and Conservation. 1999. Montana Water Plan: Ground Water Section.

### Nebraska

Basin Management Approach, (<http://www.deq.state.ne.us/SurfaceW.nsf/pages/BMA>), August 8, 2000.

Bender, John, Department of Environmental Quality, Water Quality Division, personal communication, August 9, 2000.

Gaul, Steve, Department of Natural Resources, personal communication, July 1, 2000.

Locker, Steve, Department of Environmental Quality, Water Quality Division, personal communication, August 8, 2000.

### Nevada

NEV. REV. STAT. 540.011 (1999).

NEV. REV. STAT. 540.051 (1999).

NEV. REV. STAT. 540.101 (1999).

NEV. REV. STAT. 540.111 (1999).

Nevada State Water Plan, 1999, (<http://www.state.nv.us/cnr/ndwp/wat-plan/contents.htm>), July 13, 2000.

1977 Nev. Stat. 1170, §160.

1987 Nev. Stat. 2280, §30.

1989 Nev. Stat. 1237, §6.

1991 Nev. Stat. 173, §1.  
1995 Nev. Stat. 2499, §§1, 3, 4, 15, 16.

### New Hampshire

Chapter 483: New Hampshire Rivers Management & Protection Program,  
(<http://www.des.state.nh.us/rivers/rsa483.htm>), June 26, 2000.  
Comstock, Greg, Department of Environmental Services, personal communication, July 18,  
2000.  
New Hampshire Rivers Management & Protection Program,  
(<http://www.des.state.nh.us/rivers/descriptn.htm>), June 26, 2000.

### New Jersey

Cenno, Kim, Principal Geologist, Northeast Bureau, Department of Environmental Protection,  
Division of Watershed Management, personal communication, July 17, 2000.  
New Jersey Department of Environmental Protection. 1999. Strategic Plan.  
New Jersey Department of Environmental Protection, Division of Science and Research. 1998.  
New Jersey's Environment 1998.  
New Jersey Department of Environmental Protection, Division of Watershed Management.  
2000. Action Now Strategy of the Whippany River Watershed Management Plan.  
New Jersey Department of Environmental Protection, Division of Watershed Management.  
2000. A Cleaner Whippany River Watershed, Nonpoint Source Pollution Control Guidance  
Manual for Municipal Officials, Engineers and Departments of Public Works.  
New Jersey Department of Environmental Protection, Division of Watershed Management.  
1999. Planning for Clean Water: The Municipal Guide.  
New Jersey Department of Environmental Protection, Office of Environmental Planning. 1997.  
Statewide Watershed Management Framework Document for the State of New Jersey  
(Draft).  
New Jersey Department of Environmental Protection, Office of Environmental Planning. 1996.  
Water For the 21st Century: The Vital Resource, New Jersey State Wide Water Supply Plan.  
New Jersey Department of Environmental Protection, Office of Environmental Planning. 1996.  
Water For the 21st Century: The Vital Resource, New Jersey State Wide Water Supply Plan,  
Appendices.  
New Jersey Department of Environmental Protection, Office of Environmental Planning. 1996.  
Water For the 21st Century: The Vital Resource, New Jersey State Wide Water Supply Plan,  
Executive Summary.  
Watershed Protection and Management Act of 1997, 1997 N. J. Laws 261.  
Water Resources Management, (<http://www.state.nj.us/dep/watersupply/wateresc.htm>), June 26,  
2000.

### New Mexico

Somes, Glen, New Mexico Environment Department, Water and Waste Management Division,  
personal communication, August 8, 2000.

Surface Water Quality Bureau: New Mexico Environment Department,  
(<http://www.nmenv.state.nm.us/swqb/sections.html>), August 8, 2000.

### New York

Background: New York State Unified Watershed Assessment Report,  
(<http://www.dec.state.ny.us/website/dow/uwa/index.htm>), August 18, 2000.  
Bureau of Watershed Management, (<http://www.dec.state.ny.us/website/dow/bwm.htm>), June 26, 2000.  
Environmental Protection Agency/New York State Performance Partnership Agreement, (Draft),  
(<http://www.epa.gov/region02/nepps/nyppa99.htm>), August 18, 2000.  
Natural Resources Conservation Service, USDA, New York Department of Environmental Conservation. 1998. Unified Watershed Assessment and Watershed Protection and Restoration Priorities for New York State.  
New York State Water Resources Planning Council. 1989. Water Resources Management Strategy.  
Smith, Libby, Department of Environmental Conservation, Natural Resources Division, personal communication, August 18, 2000.  
Stevens, Ken, Bureau of Water Permitting, personal communication, July 14, 2000.

### North Carolina

Kuchen, Darlene, Division of Water Resources, Water Supply Planning Section, personal communication, July 14, 2000.  
North Carolina State Water Supply Plan, ([http://www.dwr.ehnr.state.nc.us/wsas/nc\\_swsp.htm](http://www.dwr.ehnr.state.nc.us/wsas/nc_swsp.htm)), June 14, 2000.  
Young, Tony, Division of Water Resources, personal communication, July 14, 2000.

### North Dakota

Klapprodt, LeRoy, Director of Planning and Education Division, personal communication, July 17, 2000.  
North Dakota State Water Commission. 1999. State Water Management Plan.  
North Dakota State Water Commission. 1999. State Water Management Plan, Executive Summary.  
North Dakota State Water Commission. 1997. Water Resource Districts: Waterguide.  
North Dakota State Water Commission and Office of the State Engineer. 1999. Biennial Report.  
The 1999 North Dakota State Water Management Plan, (<http://www.swc.state.nd.us/swp/>), June 14, 2000.  
Southwest Water Authority. 1999. Water: Quality, Quantity Water for Southwest North Dakota, 1999 Annual Operating Report.

### Ohio

Baker, Kim, Ohio Department of Natural Resources, Division of Water, personal communication, August 23, 2000.

Bartz, Dick, Assistant Chief, Ohio Department of Natural Resources, Division of Water, personal communication, September 1, 2000.

Dudley, Dan, Ohio Environmental Protection Agency, Division of Surface Water, personal communication, August 18, 2000.

Governor's Blue Ribbon Task Force on Water Resources Planning and Development. 1994. Ohio's Water Ohio's Future: Final Report.

Ohio Water Resources Council. 1998. Ohio Water Resources Strategic Plan.

Water Resources Planning and Development Implementation Committee. 1994. Institutional Analysis of Water Resources Programs and Planning Functions.

Water Resources Planning and Development Implementation Committee. 1995. Final Report of the Water Resources Planning and Development Implementation Committee to the Governor.

### Oklahoma

1974 Okla. Sess. Laws 25, §§1, 2 (West).

1992 Okla. Sess. Laws 48, §§1, 2 (West).

OKLA. STAT. ANN. 82 §1086.1 (West 1990 & Supp.2000).

OKLA. STAT. ANN. 82 §1086.2 (West 1990 & Supp. 2000).

Update of the Oklahoma Comprehensive Water Plan, 1995,  
(<http://www.state.ok.us/~owrb/ocwp/Ocwp.html>), June 15, 2000.

Vance, Brian, Oklahoma Water Resources Board, personal communication, July 18, 2000.

### Oregon

Byler, Tom, Oregon Water Resources Department, personal communication, July 13, 2000.

OR. REV. STAT. §§ 541.351 - 415 (1999).

The 1999-2001 Strategic Plan for Managing Oregon's Water Resources,  
(<http://www.wrd.state.or.us/publication/stratplan99/index.shtml>), June 15, 2000.

### Pennsylvania

Gandell, Stuart, Department of Environmental Protection, personal communication, July 17, 2000.

Integrated Water Resources Management in Pennsylvania,  
(<http://www.dep.state.pa.us/...putate/watermgt/General/WaterResrcKey.htm>), July 17, 2000.

Pennsylvania State Water Plan,  
([http://www.penn.de.state.pa.us/penndep/html/swp104\\_meta.htm](http://www.penn.de.state.pa.us/penndep/html/swp104_meta.htm)), June 15, 2000.

### Rhode Island

Getz, Tom, Department of Environmental Management, personal communication, August 8, 2000.

Hanlon, Peter, Department of Environmental Management Office of Strategic Planning and Policy, personal communication, September 12, 2000.

Rhode Island Department of Environmental Management, Work Plan for 2000-2001, (<http://www.state.ri.us/dem/plans/workplan.htm>), August 2000.  
Office of Water Resources, (<http://www.state.ri.us/dem/programs/waterres.htm>), September 13, 2000.  
Water Resources Board, (<http://webster.wrb.state.ri.us>), September 13, 2000.  
Watershed Approach Committee Writing Group. 1999. Rhode Island Watershed Approach Framework, Draft.

### South Carolina

South Carolina Department of Natural Resources, Land, Water and Conservation Division, South Carolina 1998 Water Plan, (<http://www.dnr.state.sc.us/water/hydro/waterplan.html>), June 15, 2000.

### South Dakota

State Water Plan, ([http://www.state.sd.us/denr/DFTA/WWFunding/state\\_water\\_plan.htm](http://www.state.sd.us/denr/DFTA/WWFunding/state_water_plan.htm)), June 15, 2000.

### Tennessee

Galbrath, Don, Environmental Planning Office, personal communication, July 18, 2000.  
Tennessee Department of Environment and Conservation: Division of Water Pollution Control: Watershed Management Approach, (<http://www.state.tn.us/environment/wpc/wshed1.htm>), June 26, 2000.

### Texas

Lower Colorado River Authority, Development of the Drought Management Plan, (<http://www.lcra.org/water/wmp/chapter4.html>), June 15, 2000.  
Texas Natural Resource Conservation Commission, Texas Clean Rivers Program, (<http://www.tnrcc.state.tx.us/water/quality/data/wmt/tcrp.html>), August 2, 2000.  
Texas Water Development Board, State Water Plan, 1997, (<http://www.twdb.state.tx.us/wrp/state-plan/97-water-plan.htm>), June 14, 2000.

### Utah

Developing a State Water Plan, 1963 Utah Laws 178, §§1, 2, 3.  
Gillette, Paul, Deputy Director of the Comprehensive Water Planning Division, Division of Water Resources, personal communication, July 18, 2000.  
UTAH CODE ANN. §73-10-1 (1989 & Supp. 1999).  
UTAH CODE ANN. §73-10-15 (1989).  
UTAH CODE ANN. §73-10-16 (1989).  
1967 Utah Laws 176, §22.  
Utah State Water Plan, Executive Summary, 1990, ([http://www.nr.state.ut.us/wtrresc/planning/swp/Swp\\_2.htm](http://www.nr.state.ut.us/wtrresc/planning/swp/Swp_2.htm)), July 18, 2000.

Utah Water Research Laboratory, State Water Plan,  
(<http://www.engineering.usu.edu/uwrl/www/publications/aquarius/aqmar90.html>), June 15,  
2000.

Water Rights and Irrigation Act, 1903 Utah Laws 100.

### Vermont

Department of Environmental Conservation, Field Guide,  
(<http://www.anr.state.vt.us/fguide/fguide4.htm>), June 26, 2000.

Department of Environmental Conservation, Vermont Agency of Natural Resources. 2000.  
Strategic Plan for 2001-2005, Waterbury, Vermont.

Hopkins, Rick. Supervisor of Water Resources Planning, personal communication, July 18,  
2000.

### Virginia

Patron, Erlynda, Environmental Engineer, Department of Environmental Quality, personal  
communication, July 18, 2000.

Virginia's Watershed Planning Process for Water Quality Management: A Continuing Planning  
Process, (<http://www.deq.state.va.us/water/wqmap.html>), June 26, 2000.

### Washington

Bailey, Gary, Department of Ecology, personal communication, July 14, 2000.

Bailey, Sam, Department of Ecology, personal communication, July 14, 2000.

WASH. REV. CODE § 90.82 (2000).

Washington Department of Ecology: Water Quality Program,  
(<http://www.wa.gov/ecology/pie/98overvu/98aowq.html>), June 21, 2000.

Washington Department of Ecology: Water Resources Management Program for the Methow  
River Basin, WRIA 48, (<http://www.wa.gov/ecology/wr/rights/m-rule-f.html>), June 21, 2000.

Washington Department of Ecology: Water Resources Program,  
(<http://www.wa.gov/ecology/pie/98overvu/98aowr.html>), June 21, 2000.

Watershed Planning, Washington Department of Ecology,  
(<http://www.ecy.wa.gov/watershed/index.html>), September 7, 2000.

### West Virginia

Branon, Bill, Assistant Chief of Groundwater Quality, personal communication, August 10,  
2000.

### Wisconsin

Areawide Water Quality Management Plans, ch. NR 121, Wis. Admin. Reg., July, 2000, 535.

Martin, Ron, Department of Natural Resources, personal communication, August 7, 2000.

Wisconsin Water Management and Conservation, ch. NR 142, Wis. Admin. Reg., March, 2000,  
531.

## Wyoming

Wade, John, Wyoming Water Development Commissioner, personal communication, August 7, 2000.

1957 Wyo. Sess. Laws 101, §1.

1973 Wyo. Sess. Laws 233; §1.

Wyoming Water Planning Process Implementation Recommendations: Executive Summary, 1999, (<http://waterplan.state.wy.us/execsum/execsum.html>), July 14, 2000.