



# FISCAL RESEARCH CENTER

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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Andrew Young School of Policy Studies  
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FRC Report No. 212  
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**ANDREW YOUNG SCHOOL**  
OF POLICY STUDIES

**AN ANALYSIS OF WATER  
RELATED INFRASTRUCTURE  
SPENDING IN GEORGIA**

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## **Acknowledgments**

The author would like to thank David Sjoquist and John Matthews for their thoughtful guidance and input to this report. All errors or omissions, though, remain the responsibility of the author.

# An Analysis of Water Related Infrastructure Spending in Georgia

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## Table of Contents

Acknowledgments.....	ii
Executive Summary .....	iv
I. Introduction .....	1
II. Historical Influence on Current Water Related Infrastructure .....	4
Water Infrastructure Costs for Older Counties and Cities.....	5
Water Supply .....	6
Wastewater .....	9
Stormwater .....	10
III. Future Spending in Metro Water District .....	12
Wastewater and Water Supply Cost Estimates.....	13
Funding: The Role of Georgia Environmental Facilities Authority .....	17
Water Supply Planning after the Tri-State Water Rights Litigation .....	19
IV. Stormwater Cost Estimates.....	26
Current Funding Methods.....	26
Stormwater Future Costs .....	27
Hidden Costs: Litigation and Federal Total Maximum Daily Loads .....	33
V. Wastewater and Supply Cost Estimation for the other 143 Georgia Counties .....	36
Rural Georgia .....	36
Power Plant Usage.....	38
Metropolitan Counties not in the Metro Water District .....	38
Stormwater outside Metro Water District .....	41
VI. Conclusion .....	43
References.....	46

# **An Analysis of Water Related Infrastructure Spending in Georgia**

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## **Executive Summary**

Georgia's state and local water resources and infrastructure have been the subject of much discussion in the media as well as the subject of a recent federal court ruling. This report examines the effects of past Georgia state and local government infrastructure investments and conservation policies on water quality and quantity and explores the necessary infrastructure investment to maintain future water quality and quantity. This is one of several reports that explore Georgia's infrastructure needs and the likely cost of necessary investments in the infrastructure.

This report provides comprehensive estimates for future water related infrastructure costs in Georgia, as well as an overview of the current state of water related infrastructure in the state. We rely primarily on existing sources, particular for the Atlanta metropolitan area. We use these data to show how the costs of water infrastructure will likely be distributed in the different counties in the Atlanta metropolitan area. We also use these data to estimate the cost of stormwater management for the Atlanta metropolitan area, which has not been done to date. In addition, this report estimates costs for other urban counties throughout the state for water supply and wastewater infrastructure. Finally, we offer a total estimate for water related infrastructure for the state for the years 2010-2030. We offer no policy prescriptions for how to deal with the high cost of future water related infrastructure. However, we do comment on events that may have an impact on future costs and issues not fully addressed by current sources.

The state has taken two major steps to develop plans to manage the state's water resources. The Metropolitan North Georgia Water Planning District (Metro Water District) was created by the Georgia General Assembly in 2001 in an effort to plan effectively for the metropolitan Atlanta area future water needs. We rely on reports by the Metro Water District. In 2008, Georgia passed the Statewide Water Management Plan, comprehensive water planning legislation for the rest of the state.

The Metro Water District concluded that the Atlanta region would need to significantly upgrade its water infrastructure to accommodate future growth and evolving environmental standards. To meet this challenge state and local governments will have to spend considerable funds as well as engage in effective

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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regional planning. These costs are not evenly distributed throughout the region. The costs of total repairs and improvements to water supply and wastewater treatment infrastructure are likely to be higher for older urban areas such as Fulton and DeKalb counties and the three other core counties of Clayton Cobb, and Gwinnett, than the other counties in Metro Water District. However, the per capita costs are estimated to be higher for the exurban counties in the Metro Water District.

The Metro Water District completed its plan and created its cost estimates prior to the 2009 federal court decision in the Tri-State Water Rights Litigation. This ruling requires that Georgia, Florida, and Alabama negotiate and agree to a legal water allocation from Lake Lanier within three years. If no settlement or allocation decision is reached, the court will enforce the last legal allocation from 1975. This decision and the resulting new water allocation will likely cause the Metro Water District plans to be modified.

Governor Perdue created the Water Contingency Planning Task Force (Task Force) to analyze the potential water shortfall in Georgia in light of the Water Rights Litigation, and to develop a contingency plan. The Task Force made several recommendations. First, the Task Force recommended that increasing conservation should be a high priority regardless of the outcome of the Lake Lanier reauthorization efforts. Second, even if the reports most stringent conservation measures were to be mandatorily implemented by 2012, the Metro Water District area would still face a significant water supply shortfall if the 2012 Water Rights Litigation ruling were to take effect. The Task Force found no acceptable water supply alternative to the authorization of Lake Lanier for water supply for the Metro Water District area prior to 2012. Third, the earliest that a potential alternative solution to using Lake Lanier for water supply would be viable is 2015, however this option is very expensive.

In 2008, Georgia passed comprehensive water planning legislation for the rest of the state. This legislation is similar to that which created the Metro Water District and requires similar plans to be developed by regions. As of now, there are no state estimates as to the cost of implementing future water system infrastructure improvements in the rest of the state. It is not feasible for us to estimate the cost of water supply and wastewater infrastructure required in the future for rural counties in

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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Georgia. However, future expenses for the other urban counties in Georgia outside the Metropolitan Atlanta area are not likely to be trivial. Using similar methods as used by the Metro Water District, we estimate the cost for those urban counties not in the Metropolitan Atlanta area for the necessary improvements to water treatment as well as water supply facilities.

We also examine the impact of required improvements to stormwater infrastructure for state and local governments. The Environmental Protection Agency (EPA) has encouraged the statewide management of stormwater runoff and nonpoint source pollutants since the 1987 amendments to the Clean Water Act. Here again, Georgia state and local governments have been slow to adopt best practices.

Here is a summary of our cost estimates for both Metro Water District and the rest of urban Georgia. To make comparisons across districts and time easier, we present only figures for the period 2010-2030 in Table E1. It is our goal to present the magnitude of the estimated future infrastructure and operation and maintenance costs for water supply, wastewater treatment and stormwater infrastructure. Our estimates rely on our own assumptions and the estimates of others, thus they are subject to uncertainty. To try to capture some of that uncertainty, we take the estimated costs for the Metro Water District and give them a range of plus or minus 20 percent. Our other estimates of stormwater and the urban area outside of Atlanta already factor in a similar level of uncertainty. For the Metro Water District, the estimated cost for water supply and wastewater treatment infrastructure including operation and maintenance from 2010 to 2030 is \$30.6 billion-\$46.0 billion. Stormwater infrastructure costs and operation and maintenance are estimated to be \$3.2 billion-\$5.5 billion from 2010-2030. Thus, total cost of water related infrastructure and operation and maintenance is \$33.8 billion-\$51.5 billion for the Metro Water District.

These are very large numbers. To put some perspective on the magnitudes, it may be helpful to compare them to the projected cost of the Task Force's recommendation for the 2015 contingency plan. The Task Force recommended a potable reuse water option which would require the pumping of water from some point downstream from Atlanta back to Lake Lanier. Due to the extremely high costs

## An Analysis of Water Related Infrastructure Spending in Georgia

**TABLE E1. SUMMARY FOR 2010-2030**

<b>The Metro Water District</b>	<b>Low Cost Estimate*</b>	<b>High Cost Estimate*</b>
Wastewater and Water Supply Capital Spending, Operation and Maintenance	\$30.6	\$46.0
Storm Water Capital Spending and Operation and Maintenance	\$3.2	\$5.5
Total Metro Water District	\$33.8	\$51.5
Urban Georgia Outside the Metro Water District	\$10.2	\$14.8
Total State Water Infrastructure Spending: Capital, Operation and Maintenance	\$44.0	\$65.8

\* in billions of 2008 dollars.

Source: Metropolitan North Georgia Water District (2003b,c), Metropolitan North Georgia Water District (2008c) and author's calculations.

of this project, the Task Force only recommends it out of necessity. The cost of completing such a project by 2015 was estimated to be \$3 billion, if Georgia would start the project in 2011, it would cost roughly \$750 million per year.

However, the annual cost of the Task Force's last resort project is less than half the annual cost of the estimated needed improvements to the Metro Water District water related infrastructure including operations and maintenance. The estimated annual cost to the Metro Water district for necessary water related infrastructure is \$1.7 billion to \$2.6 billion. (That is the total estimated costs \$33.8 billion and \$51.5 billion divided by 20 years.) For the urban areas in Georgia outside the Metro Water District, our estimates for water supply and wastewater treatment infrastructure and operation and maintenance are \$10.2 billion to \$14.8 billion, for the period 2010 to 2030.

By our estimates as well as those of the Metro Water District, the state of Georgia will incur \$44.0 billion-\$65.8 billion in water related infrastructure costs from 2010-2030. This is \$2.2 billion-\$3.3 billion annually for the next 20 years. These costs are likely to be borne primarily by local governments and water authorities and will vary in different parts of the state. Some local governments and water authorities will be able to use traditional bond financing to raise money for this necessary infrastructure. Others will have to look to Georgia Environmental Facility Authority and perhaps nontraditional infrastructure financing.



## **An Analysis of Water Related Infrastructure Spending in Georgia**

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The largest share of the water related infrastructure spending in Georgia will be done in the Metro Water District. Given the In re Tri-State Water Rights Litigation decision and ongoing negotiations with Alabama and Florida, the allotment of water the Metro Water District can expect from Lake Lanier is uncertain. However, given the Task Force's recommendation that additional conservation measures be pursued regardless of the allotment, as well as Georgia's weakened bargaining position, it would seem that conservation will play a larger role in future Metro Water District plans.

# **An Analysis of Water Related Infrastructure Spending in Georgia**

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## **I. Introduction**

Georgia's state and local water resources and infrastructure have been the subject of much discussion in the media as well as the subject of a recent federal court ruling. This report examines the effects of past Georgia state and local government infrastructure investments and conservation policies on water quality and quantity and explores the necessary infrastructure investment to maintain future water quality and quantity. This is one of several reports that explore Georgia's infrastructure needs and the likely cost of necessary investments in the infrastructure.

This report provides comprehensive estimates for future water related infrastructure costs in Georgia, as well as an overview of the current state of water related infrastructure in the state. We rely primarily on existing sources, particular for the Atlanta metropolitan area. We use these data to show how the costs of water infrastructure will likely be distributed in the different counties in the Atlanta metropolitan area. We also use these data to estimate the cost of stormwater management for the Atlanta metropolitan area, which has not been done to date. In addition, this report estimates costs for other urban counties throughout the state for water supply and wastewater infrastructure. Finally, we offer a total estimate for water related infrastructure for the state for the years 2010-2030. We offer no policy prescriptions for how to deal with the high cost of future water related infrastructure. However, we do comment on events that may have an impact on future costs and issues not fully addressed by current sources.

The state has taken two major steps to develop plans to manage the state's water resources. The Metropolitan North Georgia Water Planning District (Metro Water District) was created by the Georgia General Assembly in 2001 in an effort to plan effectively for the Metropolitan Atlanta area future water needs. We rely on reports by the Metro Water District. In 2008, Georgia passed the Statewide Water Management Plan, comprehensive water planning legislation for the rest of the state.

The Metro Water District concluded that the Atlanta region would need to significantly upgrade its water infrastructure to accommodate future growth and evolving environmental standards. To meet this challenge state and local governments will have to spend considerable funds as well as engage in effective

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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regional planning. The total cost for water quality infrastructure needs in the Metro Water District from 2001 to 2030 is estimated by the Metro Water District to be \$79.5 billion-\$81.8 billion. These costs are not evenly distributed throughout the region. The costs of total repairs and improvements to water supply and wastewater treatment infrastructure are likely to be higher for older urban areas such as Fulton and DeKalb as well as the three other core counties of Clayton Cobb, and Gwinnet, than the other counties in Metro Water District. However, the per capita costs are estimated to be higher for the exurban counties in the Metro Water District.

The Metro Water District completed its plan and created its cost estimates prior to the 2009 federal court decision in the Tri-State Water Rights Litigation. This ruling requires that Georgia, Florida, and Alabama negotiate and agree to a legal water allocation from Lake Lanier within three years. If no settlement or allocation decision is reached, the court will enforce the last legal allocation from 1975. This decision and the resulting new water allocation will likely cause the Metro Water District plans to be modified. While the cost of these modifications cannot be estimated at this time, we offer some guidance as to what the changes to the plan may entail and what areas are likely to be the most affected.

In 2008, Georgia passed comprehensive water planning legislation for the rest of the state. This legislation is similar to that which created the Metro Water District and requires similar plans to be developed by regions. As of now, there are no state estimates as to the cost of implementing future water system infrastructure improvements in the rest of the state. It is not feasible for us to estimate the cost of water supply and wastewater infrastructure required in the future for rural counties in Georgia. However, future expenses for the other urban counties in Georgia outside the Metropolitan Atlanta area are not likely to be trivial. Using similar methods as used by the Metro Water District, we estimate the cost for those urban counties not in the Metropolitan Atlanta area for the necessary improvements to water treatment as well as water supply facilities to be \$5.1 billion-\$7.2 billion over the period 2010 to 2020.

We also examine the impact of required improvements to stormwater infrastructure for state and local governments. The Environmental Protection Agency

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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(EPA) has encouraged the statewide management of stormwater runoff and nonpoint source pollutants since the 1987 amendments to the Clean Water Act. Here again, Georgia state and local governments have been slow to adopt best practices. We estimate the cost to the Metro Water District for stormwater maintenance and infrastructure for the period 2010-2030 to be \$3.2 billion-\$5.5 billion. The current stormwater funding mechanisms in the Metro Water District are also reviewed. In addition, we discuss the potential for costly litigation spawned by land use planning associated with controlling stormwater runoff.

The report is organized as follows. In section II, the historical influence of Georgia state and local governments on the current state of water related infrastructure is discussed. Particular attention is paid to the city of Atlanta, which has an egregious history of past neglect and mismanagement of water supply and wastewater infrastructure, and is now spending billions to correct the problems. In section III, the future spending in Metro Water District necessary to meet the district's plans is discussed, and how that spending will be financed is analyzed. We then estimate the cost to individual counties in the Metro Water District on a per household basis to implement these plans. In addition, the effect of the Tri-State Water Rights Litigation is discussed. In section IV, stormwater implementation estimates are made for the Metro Water District and current funding methods are discussed. In section V, wastewater and supply cost estimation for the other urban Georgia Counties are explained and water policy and infrastructure spending for rural Georgia counties is discussed. Section VI concludes.

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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### **II. Historical Influence on Current Water Related Infrastructure**

Georgia state and local governments have not adequately maintained past infrastructure investments or pursued conservation policies that would benefit water quality and infrastructure. The Georgia General Assembly created the Metro Water District in 2001 (O.C.G.A. §12-5-571) to correct past mistakes and plan effectively for future needs. The Metro Water District, which consists of 16 counties, was charged with coordinating water policy for most of Metropolitan Atlanta.<sup>1</sup> In 2003, the district issued three plans, a wastewater plan, a water supply plan, and a watershed management plan, each with planning horizon of 30 years. Total Metro Water District costs based on the 2003 estimates were \$79.5-\$81.8 billion for water supply and wastewater infrastructure over the next 30 years, including operation and maintenance (Metropolitan North Georgia Water District 2003b,c and Metropolitan North Georgia Water District 2008c).<sup>2</sup>

However, the state as well as local governments could have done more to conserve water and save money many years sooner before water planning reached a crisis. Many items listed on the current conservation plans in the 2003 Metro Water District report are the same as rules adopted by the Department of Natural Resources in 1994 to encourage local water authorities to conserve water. These historical decisions and their effects on each water quality category, water supply, wastewater, and stormwater, are reviewed next.

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<sup>1</sup> Walton County is no longer included in the Metro Water District. The current 15 counties include: Bartow, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Fulton, Forsyth, Gwinnett, Hall, Henry, Paulding, and Rockdale counties. Walton County is included in our analysis of the Metro Water District as detailed cost data exist and it is part of the Metropolitan Atlanta area.

<sup>2</sup> The 2008 updated reports are available and are generally similar to the 2003 reports. However, the 2003 report is more useful for our purposes since it offers more detail to illustrate the historical level of water infrastructure spending by state and local governments. In addition, the 2003 report has more detailed cost data to use to estimate future expenses.

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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### **Water Infrastructure Costs for Older Counties and Cities**

The costs of total repairs to water supply and wastewater treatment infrastructure are likely to be higher for older urban areas than the other counties in the District (American Society of Civil Engineers 2009, Metropolitan North Georgia Water District 2003b,c). These older urban areas are located in the five core counties of Fulton, Gwinnett, DeKalb, Cobb and Clayton. There are several reasons for the higher cost. First, in these core counties the age of the water system infrastructure is considerably older than the surrounding areas. For instance, the bulk of the city of Atlanta, Fulton, and DeKalb County's water systems are more than 50 years old (Matthews 2010, Metropolitan North Georgia Water District 2003b,c).<sup>3</sup> In addition, the city of Atlanta did not use standard bond funding to construct its water supply system but instead relied on general funds until roughly 1968.<sup>4</sup> This type of funding did not allow for money to be set aside for necessary regular maintenance and repairs. Even after the city switched to bond financing, it was forced to use whatever money it set aside for future repairs to pay for past repair needs, due to decades of neglect (Matthews 2010).

Another key difference in the five core counties is that they contain cities that experience large increases in daytime populations from an influx of commuters. Thus, these systems must be considerably larger than the surrounding bedroom communities of comparable census populations. For instance, according the Census Bureau (2000) four of the top five cities in the region in terms of the increase in population during daytime are located in these 5 core counties: city of Atlanta with 259,957 additional population, Marietta with 36,957, Alpharetta with 34,278, and Sandy Springs with 28,059. At the county level the comparison is even more dramatic, only Fulton County has a significant increase in daytime commuter

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<sup>3</sup> The consent decree of 1998 required the city to repair or replace many miles of old or damaged sewer and water pipes. To that end the city has: Separated 33 miles of combined sewers, Inspected 1,287 of the 1,580 miles of sewer pipe, Rehabbed 314 miles of sewer pipe, and Replaced more than 60 miles of water pipes and mains (City of Atlanta Department of Watershed Management 2010).

<sup>4</sup> John Matthews, planner for the city of Atlanta and Fulton County, remembers the year as 1968 (Matthews 2010).

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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population of all counties in the Metro Water District, with a gain of 332,260, representing an increase of 41 percent of the resident population.<sup>5</sup>

Finally, treating wastewater in the five core counties is generally much more difficult due to the presence of institutions, firms, and manufacturing facilities that discharge chemical affluent into the system. The amount, as well as the toxicity of these chemical affluent make the treatment of wastewater considerably more difficult than in areas that treat primarily residential affluent. For instance, some of the chemicals used to clean and maintain planes at Hartsfield-Jackson Atlanta International Airport end up going into the sewer system.

### **Water Supply**

Georgia state and local governments have been slow to implement policies that would conserve water supply and thus extends the useful life of current water supply infrastructure.<sup>6</sup> In 1994, the Georgia Department of Natural Resources adopted rules to encourage statewide water conservation by water authorities. The rules required that water authorities target water loss, develop new rate structures, engage in water demand management, and develop long-range plans (See Table 1 for detailed list of rules). Suppliers requesting new or expanded withdrawal permits of 100,000 gallons per day or more had to comply with the 1994 rules (Baer 2001).

However, there were few requirements for water authorities to implement the above plans and actions. For example, rate making policies had to be summarized but did not have to be converted to an inclining rate or seasonal surcharge structure. As a result, few authorities adopted the policies put forth in their plans (Baer 2001). In addition, Georgia provided little conservation outreach and technical assistance at the state level (Baer 2001).

The severe drought of 1999-2001 renewed interest in water planning. The 2003 Metro Water District Water Supply Report estimated that the Atlanta district's

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<sup>5</sup> Hall County is the only other county with a gain from commuters with an estimate of 250 people.

<sup>6</sup> Water conservation benefits water supply infrastructure and wastewater treatment infrastructure. If less water is consumed that means less water needs to be treated by the supply plants and less has to be treated at the wastewater plants. This prolongs the life of both types of facilities and delays costly expansions and the need for new facilities.

## An Analysis of Water Related Infrastructure Spending in Georgia

**TABLE 1. DEPARTMENT OF NATURAL RESOURCES 1994 RULE COMPARED WITH 2003 METRO WATER DISTRICT SUGGESTED CONSERVATION MEASURES**

Dept. of Natural Resources 1994 Rule	Metro Water District Conservation Plan 2003
Reduce water system leakages.	Assess and reduce water system leakage.
Review rate making policies.	Establish conservation pricing by all District utilities.
Plumbing ordinances and codes--water systems must document compliance with state mandated ultra low flow rules.	Enact legislation to require plumbing retrofits on home re-sales.
Current and planned education programs.	Implement education and public awareness plan.
Long-range planning--this must include projections incorporating conservation efforts.	Establish review & oversight of water conservation implementation and performance.
Recycling and reuse programs.	Legislation to require low-flush urinals for new industrial, commercial and institutional buildings.
Water use data.	Legislation to require rain sensor shut-off switches on new irrigation systems.
	Require sub-unit meters in new multi-family buildings.
	Conduct residential water audits.
	Distribute low-flow retrofit kits to residential users.
	Conduct commercial water audits.

Source: Georgia Environmental Protection Division, from (Baer 2001), and Metropolitan North Georgia Water District (2003c).

water supply would be insufficient to meet demand at current consumption rates by 2013. The plan called for building five new reservoirs as well as reallocating the waters of Lake Lanier and Altoona for water supply.<sup>7</sup> In addition, the district outlined 11 conservation measures that it estimated would cut usage by 11 percent by 2030.

Table 1 illustrates both the state and local governments' reluctance to enact meaningful measures to conserve water. The top two water saving measures in the 2003 plan were included in the DNR rules of 1994. Reducing system leakage accounts for 35 percent of the potential total water conserved, while conservation pricing accounts for 24 percent of the 2003 potential total water reductions (Pacific Institute 2006). Mandatory plumbing retrofits on all home sales are estimated to save

<sup>7</sup> Due to the state's current severe budgetary shortfall, the \$40 million in state funding for these reservoirs was taken out of the 2008 fiscal year budget. As of this writing, it is unknown if or when state funding will be returned.



## **An Analysis of Water Related Infrastructure Spending in Georgia**

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20 percent (Pacific Institute 2006). The 2003 plan that would implement mandatory plumbing retrofits above is similar to the 1994 rule requiring compliance with state ultra-low-flow fixture rules.<sup>8</sup> These three programs account for 79 percent of the estimated conservation amount in the 2003 plan.

The requirement to establish review and oversight of water conservation implementation performance in the 2003 plan also appears very similar to items included in the 1994 DNR rulemaking such as: long-range planning that incorporate conservation efforts, recycling and reuse programs, and water use data. Had local governments or water authorities instituted these initiatives earlier, some of the \$26.2 billion in future expenditures listed in the 2003 Water Supply Plan could have been avoided.<sup>9</sup>

Another indicator of the adequacy of historical spending on water supply by state and local governments is the American Society of Civil Engineers (ASCE) report. In 2003, the ASCE gave Georgia water supply infrastructure a grade of B-. This grade was based on the statewide success in providing potable drinking water to a large percentage of its residents. The state water management plan was also anticipated to suitably plan for the additional capacity required by population growth.

The 2009 grade assigned to water supply was a C+. The ASCE found some positive trends in Georgia water supply infrastructure since 2003, but the severe drought and the ramifications it had on water systems caused the grade to fall. The ASCE noted that more treatment plants had improved water quality by adopting better treatment technology. However, the drought was so severe that the state imposed water restrictions and encouraged conservation. Georgians did an admirable

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<sup>8</sup> The mandatory plumbing retrofits have been dropped from the 2008 plan update and were replaced with a voluntary program. The district began to offer rebates for the purchase of low-flow toilets in 2008. The district has replaced about 15,000 older toilets, which use 5 to 7 gallons per flush, since the program's inception. In 2008 it was estimated there were 425,000 older toilets in the Metro Water District, at the current annual replacement rate of 15,000 it will take almost 15 years to retrofit half the older toilets in the metro area (Foskett 2009). If older plumbing were retrofitted with low-flow fixtures, 35 million gallons of water could be conserved daily. That is roughly 5 percent of the districts total daily consumption (Metropolitan North Georgia Water District 2003c).

<sup>9</sup> Conservation also saves wastewater treatment costs. The less water used the less that needs to be treated. This saves on treatment costs as well as preserves capacity in existing treatment facilities, postponing the need for expansion.

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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job conserving water; unfortunately, conservation reduced revenues of municipal water systems. This reduction in revenue combined with the current severe downturn in the economy has left municipalities struggling to maintain their water distribution systems (Fox 2009). The ASCE (2009) is concerned that municipal systems may not have the resources necessary to address future infrastructure needs and upgrades to aging systems.

The city of Atlanta provides an example of how the lack of past maintenance on aging infrastructure can cause large current expenditures. In the week between Christmas and New Year's Day in 2005, 13 major waterlines ruptured (Wood 2006). Due to this incident as well as others, the city decided to replace waterlines along with the sewer lines that were required to be replaced by the 1998 consent decree (The consent decree is discussed below in the wastewater section). These needed repairs to water supply lines are estimated to cost \$900 million (Grillo 2008).

As the city had not adequately budgeted for these repairs to either water or sewer lines, it was forced to go to the voters to enact a special one-cent sales tax as well as incrementally raise water and sewer rates by 206 percent on average from 2003 to 2012 (Bennett 2009). The city has struggled to maintain its water main program in the face of declining water revenues and the severe economic uncertainty (Fox 2009).

### **Wastewater**

Georgia's state and local governments have also historically neglected to undertake proper repairs and maintenance of wastewater treatment infrastructure. The 2003 Metro Water District plan notes that major rehabilitation work is underway in some of the older sewer systems such as: city of Atlanta, Fulton County, Cobb County, DeKalb County, and Gwinnett County. The city of Atlanta is a particularly egregious example of the cost of past neglect of wastewater infrastructure. In the city of Atlanta, the lack of wastewater funding and maintenance had created public health hazards that were not adequately addressed until litigation forced the city to act (Shelton 2008).

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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In 1995, a lawsuit was filed against the city of Atlanta for failing to stop the discharge of raw sewage into streams from combined sewer overflows (CSOs). The cause of these discharges was an aging system full of cracked and broken pipes due to a lack of city maintenance over many years (Seabrook 1997a). The discharges were exacerbated by burgeoning population growth and rapid development (Seabrook 1997b). In 1998, a series of consent decrees were signed requiring \$2.2 billion in work to rehabilitate the sewer system and construct relief sewers (Hunter and Sukenik 2007).

The city was also required to spend \$1 billion on other capital improvements that include disinfecting improvements, new tunnel conveyance, storage and treatment facilities, as well as sewer separation. The city had to develop sufficient management, as well as operation and maintenance programs to help avoid future sanitary sewer overflows (Hunter and Sukenik 2007). Atlanta faces two binding compliance deadlines in the consent decree. The city has met the first deadline for work to be completed by 2007. The second deadline, to complete the project, is 2014.<sup>10</sup>

The ASCE was also critical of Georgia's aging wastewater infrastructure and the cost to repair it. In the 2009 report, the Georgia ASCE assigned wastewater a grade of C due to the aging infrastructure. The ASCE cited the significant financial resources required to upgrade wastewater systems and the lack of current funding sources as another reason for the low grade. The ASCE found similar faults in its 2003 report.

### **Stormwater**

The EPA has encouraged the statewide management of stormwater runoff and nonpoint source pollutants since the 1987 Amendments to the Clean Water Act. Here again, Georgia state and local governments have been slow to adopt best practices.

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<sup>10</sup> Atlanta recently filed a brief in federal court asking for a 15-year extension on the deadline to rebuild its sewers. Atlanta cites the floods of 2009 that caused \$56 million in damage to sewer facilities as well as declines in water/sewer fees and sales tax receipts resulting from the economic recession. The city also was concerned about hardship to residents if the city must rapidly raise water sewer rates again (Peters 2010).

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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The 2003 ASCE report gave Georgia a D+ for stormwater management; the reason for the grade was the lack of planning and funding statewide. Past neglect and lack of funding manifest themselves in the 2,155 miles of streams in the Metro Water District that do not meet state water quality standards (Metropolitan North Georgia Water District 2008c).

The ASCE found that Georgia had made some progress in stormwater management. However, mitigating factors still resulted in the low grade of D+ (American Society of Civil Engineers 2009). Progress included the adoption of a statewide approach to watershed management. In addition, more than 65 percent of Georgia communities have adopted floodplain management regulations. However, lack of funding for important stormwater programs was still cited as the major factor for the low grade. Without funding, communities are not proactively upgrading stormwater infrastructure to meet the required water quality standards.

### **III. Future Spending in Metro Water District**

The current expectation is that local districts will be responsible for securing the funding for the necessary water quality infrastructure projects (Metropolitan North Georgia Water District 2008a,b and Water Council 2008). However, some of the smaller counties and cities, in particular those that are expected to grow rapidly and have substantial need for infrastructure, may have trouble securing the necessary financing due to their current size and limited bonding capacity. In addition, managing the complex nature of these projects may be beyond the current experience and resources of smaller counties and cities. To overcome some of these shortcomings the Metro Water District report suggests greater interjurisdictional cooperation as well as state technical support and guidance. To overcome the financing problems the Metro Water District report recommends reliance on the Georgia Environmental Facility Authority (GEFA). The role of GEFA is discussed in this section.

The Metro Water District estimates that future water quality infrastructure costs will be substantial. The total cost for water quality infrastructure needs in the Metro Water District from 2001 to 2030 is estimated to be \$79.5 billion-\$81.8 billion (Metropolitan North Georgia Water District 2003b,c and Metropolitan North Georgia Water District 2008c). Wastewater treatment accounts for more than half the projected cost. The Metro Water District estimates the total cost of the wastewater treatment plan will be approximately \$44.9 billion (Metropolitan North Georgia Water District 2003b). The water supply plan is estimated to cost approximately \$31.4 billion (Metropolitan North Georgia Water District 2003c).

Our report assumes that the estimates and assumption of the Metro Water District are valid. However, two caveats are worth noting: First, the effect of the July 17<sup>th</sup> ruling in the litigation between Georgia, Florida and Alabama is a wildcard in Georgia water planning for the Flint River and the Chattahoochee basin. We will discuss the ruling briefly at the end of this section. Second, there is skepticism in some quarters of the ability of the Metro Water District plan to succeed without water

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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coming from elsewhere, such as the Tennessee River or the Savannah River.<sup>11</sup> If water must come from elsewhere, these critics claim that the cost of the water plan will be in the hundreds of billions of dollars (Mahoney 2007).

Neither the 2003 nor 2008 watershed management plan included comprehensive cost estimates for watershed management. Watershed management focuses predominantly on stormwater runoff. We estimate the implementation costs of the stormwater management plan to be \$3.2 billion-\$5.5 billion over 30 years. The details of the wastewater and water supply cost estimates are discussed next. We discuss the stormwater estimation methods in the next section.

### **Wastewater and Water Supply Cost Estimates**

Both wastewater treatment and water supply facilities and plants are high visibility capital expenses but are a small percentage of the total necessary water system expenditures as estimated by the Metro Water District for 2001 to 2030. The Metro Water District estimates that the wastewater treatment plan will cost approximately \$44.9 billion to implement (Metropolitan North Georgia Water District 2003b). The water supply plan is estimated by the Metro Water District to cost approximately \$31.4 billion (Metropolitan North Georgia Water District 2003c). Wastewater treatment capital costs are approximately \$7 billion, 15 percent of the total wastewater costs. Water supply treatment facilities are estimated to cost \$2.3 billion and reservoirs another \$200 million (Metropolitan North Georgia Water District 2003c). These are a relatively small part of total state water supply expenditures, representing 9 percent of total water supply costs (see Table 2).

The capital costs for pipes and pumps for conveyance and collection of water supply and wastewater as well as the operation and maintenance of these facilities represent the greater share of total expenses. For wastewater, collection system capital costs are \$16.9 billion, 37 percent of the total, while system operation and maintenance costs are \$21.0 billion, 47 percent of total wastewater funds (Metropolitan North Georgia Water District 2003b). For water supply, distribution

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<sup>11</sup> The Governor's Water Contingency Planning Task Force considered several interbasin transfer options but did not recommend any due to their high costs and strong opposition by stakeholders (see Pavey 2010 and Water Contingency Planning Task Force 2009).

## An Analysis of Water Related Infrastructure Spending in Georgia

**TABLE 2. WASTEWATER MANAGEMENT AND WATER SUPPLY EXPENDITURES  
2001-2030**

<b>Category</b>	<b>Cost*</b>	<b>% of Category Expense</b>
<b>Wastewater Management</b>		
Treatment Capital	\$7.0	15%
Collection System Capital	\$16.9	37%
Treatment O&M	\$7.9	18%
Collection System O&M	\$13.1	29%
Wastewater Management (WM) Total	\$44.9	100%
<b>Water Supply</b>		
Reservoir Capital	\$0.2	1%
Treatment Capital	\$2.3	8%
Distribution System Capital	\$9.0	29%
Treatment O&M	\$5.2	16%
Distribution System O&M	\$14.8	46%
Water Supply (WS) Total	\$31.4	100%
<b>Total WS and WM</b>	<b>\$76.3</b>	

\*In billions of 2008 dollars.

Source: Metropolitan North Georgia Water District (2003b,c) and author's calculations.

capital spending is estimated to cost \$9.0 billion, 29 percent of total water supply funds (Metropolitan North Georgia Water District 2003c). Operation and maintenance costs are estimated to cost \$20.0 billion, 62 percent of total water supply funds.

It is expected that local governments will provide the majority of funding for this new infrastructure. As shown above, these costs are substantial. However the burdens per capita are not equal across counties. While the core counties with older infrastructure will bear higher total costs, smaller counties that are projected to experience rapid population growth will generally bear higher per capita costs. Several currently small counties with 2008 populations of fewer than 200,000 have estimated infrastructure needs of more than \$1 billion. For instance, Paulding County with a 2010 population estimate of 164,000 people is expected to grow by 143 percent by 2030 (see Table 3). Paulding County is estimated to incur \$2.9 billion in total water supply and water treatment costs, or roughly \$17,700 per current resident,

## An Analysis of Water Related Infrastructure Spending in Georgia

**TABLE 3. COUNTY AND HOUSEHOLD WASTEWATER AND WATER SUPPLY COSTS**

<b>County</b>	<b>Population Estimates</b>		<b>-----Period 2010-2030-----</b>	<b>-----In the Year 2030-----</b>		
	<b>2010</b>	<b>2030</b>	<b>Population % Growth</b>	<b>Waste Wtr &amp; Supply Total Cost 20Yr*</b>	<b>Cost per Month For Avg Hshld**</b>	<b>% &gt; /Mnth Avg MWD Hshld</b>
Paulding	164,133	399,300	143%	\$2,864	\$79	62%
Bartow	114,325	257,850	126%	\$1,799	\$76	54%
Walton	100,985	224,850	123%	\$1,561	\$75	53%
Forsyth	198,752	377,450	90%	\$2,445	\$66	35%
Henry	195,402	366,900	88%	\$2,363	\$66	34%
Hall	205,801	365,200	77%	\$2,284	\$63	28%
Coweta	117,335	207,950	77%	\$1,300	\$62	27%
Douglas	125,457	219,500	75%	\$1,362	\$62	26%
Cherokee	207,130	356,850	72%	\$2,195	\$61	24%
Rockdale	83,499	138,150	65%	\$830	\$59	19%
Fayette	109,443	161,700	48%	\$901	\$52	6%
Gwinnett	785,345	995,100	27%	\$4,872	\$43	-13%
Fulton	939,071	1,149,650	22%	\$5,437	\$41	-17%
Cobb	678,864	767,150	13%	\$3,314	\$36	-27%
DeKalb	730,390	823,100	13%	\$3,544	\$36	-27%
Clayton	277,607	300,650	8%	\$1,229	\$33	-32%
District Total	5,033,538	7,111,350	41%	\$38,300	\$49	

\*In millions 2008 dollars.

\*\*Assumes 67% residential water use.

Source: Metropolitan North Georgia Water District (2003b,c) and author's calculations.

including operation and maintenance from the year 2010 to 2030. To put that amount in perspective, DeKalb County with a 2010 population estimate of approximately 730,000 people, will spend approximately \$3.5 billion in total water supply and water treatment costs, or roughly \$4,800 per current resident, in the same 20 year period to accommodate county population growth.

Table 3 illustrates the importance of cost-sharing as well as state assistance, particularly for the less populous counties. Our estimation method for county level costs is the same as that used in the Metro Water District 2003 report. The capital costs for conveyance of water, and the capital cost of collection and conveyance of wastewater, are determined by multiplying each additional person in the county by an



## **An Analysis of Water Related Infrastructure Spending in Georgia**

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average service cost. For instance, for every additional person added to a county in the 20-year period, the wastewater conveyance average service cost is \$3,700. For operation and maintenance, the cost is estimated based on total county population. Thus, for wastewater yearly operation and maintenance, the total county population is multiplied by the wastewater operation and maintenance per capita factor of \$62. These procedures are repeated for water supply (see Appendix A for more detail).

The estimated household costs for the counties that are expected to grow the fastest are considerably larger than the average Metro Water District household cost. For instance, the counties of Paulding, Bartow, and Walton have a household expense of \$79, \$76, and \$75, respectively, all are at least 50 percent higher than the Metro Water District average of \$49. The five largest counties in 2010 all have average household costs below the Metro Water District average. Even Fulton County, home to the city of Atlanta, has an estimated average household cost of \$41, which is 17 percent lower than the Metro Water District average.<sup>12</sup>

Note that these estimates treat the infrastructure cost of adding residents to denser urban areas as equal to adding residents to sparsely populated exurban areas, the areas anticipated to grow the fastest. This is not likely to be true in practice. Water and sewer infrastructure projects are very expensive and do not lend themselves to easy incremental expansion. When a decision is made to build a system, allowances are made for projected growth. Thus, places with higher populations are likely to have systems in place that allow for growth without substantial additions to water and sewer conveyance lines. However, in sparsely populated areas that are expected to grow rapidly, the existing facilities were not built to allow for easy expansion. In these areas, new plants as well as new water supply and wastewater conveyance systems will have to be constructed simultaneously. These systems will have to be built to accommodate projected growth.

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<sup>12</sup> This is mostly due to the patterns of population growth of the respective counties. Adding more population is expensive in terms of new infrastructure, \$5,700 for wastewater and water supply conveyance for new residents versus only \$132 for operation and maintenance for an existing resident. For instance, Paulding county, with \$79 average household costs in 2030, has 69 percent of its total \$2.8 billion water infrastructure expenses attributable to new residents and 31 percent attributable to operation and maintenance. While Cobb county, with \$36 per average household, has 31 percent of the total \$3.3 billion water infrastructure expenses attributable to new residents and 69 percent attributable to operation and maintenance.

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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Yet, until the full growth of an area is realized, the current residents will likely bear a heavier burden of the costs to develop the infrastructure due to the use of bond financing. Local governments generally rely on the sale of bonds to finance the expansion of the water and sewer systems. These bonds are repaid out of funds from the ratepayers of the water system. All else equal, as the population grows the water rates fall over time. Thus, the current residents tend to pay the highest rates. Therefore, the estimates in Table 3 are likely to be conservative for the exurban counties in Metropolitan Atlanta.

### **Funding: The Role of Georgia Environmental Facilities Authority**

The Metro Water District (2003b,c) report assumes that local governments will provide most of the funding for water supply and wastewater infrastructure projects. Some of the necessary infrastructure funding can be recouped from developers as impact fees and exactions. However, the majority of the necessary additional funding will come from bond issues or similar funding mechanisms. Yet, because the rapidly growing counties in the district are fairly small, they may not have the bonding capacity or expertise to fund large projects. The Metro Water District report suggests that some smaller counties might look for guidance and even partner with larger neighboring counties to solve their funding problems. (This will not likely reduce the total cost, but may make funding easier.) Another potential solution is to borrow money from the Georgia Environmental Facilities Authority (GEFA). GEFA is an agency that smaller counties and rural districts have historically turned to for aid in funding infrastructure.

Recently, GEFA's role in statewide infrastructure funding has been expanded. It was used by the city of Atlanta for its costly CSO build out and renovation. GEFA is now the state agency tasked with funding reservoir construction. Recent legislation in conjunction with the state water plan allows GEFA to fund interjurisdictional

## An Analysis of Water Related Infrastructure Spending in Georgia

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reservoir projects for water supply.<sup>13</sup> It is unclear if GEFA has the authority to fund other types of interjurisdictional projects.<sup>14</sup> The distinction is relevant because in the 2003 Metro Water District plan, reservoir construction is only estimated to be 1 percent of the total water supply expenditures over the 30 years. Because of the scope and cost of water supply and treatment projects, GEFA's ability to fund all types of interjurisdictional water supply and treatment projects will need to be clarified.

GEFA has other limitations that need to be addressed if it will be successfully used to fund wastewater and water supply infrastructure expansion in the Metro Water District. The 2003 Metro Water District report make several suggestions that would make GEFA loans more attractive to local governments for large water supply and wastewater infrastructure needs. The first modification would change the time local governments have to repay GEFA loans. Currently the longest loan length is 20 years from the date of expected project completion. However, local water-sewer systems are more accustomed to bond financing for 30 to 40 year terms (Metropolitan North Georgia Water District 2003b). The Metro Water District also suggests that balloon payments be permitted which would be useful to allow the debt to be supported by a larger customer base that would exist in the future.

The second recommendation is for modifying the restriction on the value of bonds GEFA can have outstanding at any time. GEFA is limited in its bond issuance

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<sup>13</sup> The relevant state water plan language is as follows:

- (3)... a. Priorities for consideration for funding through state bonds or GEFA loans will be as follows:
- i. Projects that enhance existing storage structures to meet water supply needs;
  - ii. New reservoirs that provide water supply to multiple jurisdictions or source replacement for jurisdictions that face constraints on current water sources;
  - iii. New reservoirs dedicated to water supply for a single jurisdiction as a sole purpose.
- b. All funding for multijurisdictional reservoir projects will be contingent upon all parties signing binding water use agreements (Water Council 2008).

<sup>14</sup> The state is currently in the process of securitizing some of GEFA's loan portfolio. How this will affect GEFA's ability to finance future infrastructure projects is an open question. The Association of County Commissions of Georgia are concerned that securitizing some of GEFA's loan portfolio will make it more difficult for small counties and jurisdictions to use GEFA to fund future infrastructure projects (Association of County Commissions of Georgia 2010). While the Georgia Public Policy foundation asserts that GEFA should be a smaller player in infrastructure financing and that the private sector will suitably fund the infrastructure needs of local water authorities (McCutchen 2009).

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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to a debt service limit that does not exceed 1 percent of state general fund revenues for the prior fiscal year. The debt service includes the current outstanding GEFA general obligation debt issued by the state, as well as the GEFA guaranteed revenue debt (Metropolitan North Georgia Water District 2003b). If one assumes annual Georgia state revenue of approximately \$18 billion, the amount of GEFA debt would be limited by the debt service payment constraint of \$180 million. At an interest rate of 4 percent, this would only allow GEFA to have \$3 billion worth of 20-year bonds outstanding in any one year.<sup>15</sup>

The third recommendation is to raise the loan cap that individual communities can borrow through GEFA. The current GEFA cap is \$35 million-\$38 million from federal and state sourced loans (Metropolitan North Georgia Water District 2003b). This final recommendation may have already been achieved in practice. It is possible to borrow larger amounts of money for a project from GEFA, if done over several years. For instance, the city of Atlanta borrowed \$150 million over three years for the CSO project. Each loan was for a specific section of the Atlanta CSO project and ranged from \$19 million to \$31 million.

### **Water Supply Planning after the Tri-State Water Rights Litigation**

The federal court's 2009 decision *In re Tri-State Water Rights Litigation* (Water Rights Litigation) will likely cause the water supply plans and wastewater plans developed by the Metro Water District to change (Magnuson 2009).<sup>16</sup> The current water supply plan calls for a substantial reallocation of the waters of Lake Lanier to water supply and also incorporates modest conservation goals. The current plan has been criticized for not doing more to conserve water (Pacific Institute 2006). In addition, the Governor's Task Force recommended that Georgia pursue greater

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<sup>15</sup> This debt service would include the current outstanding GEFA general obligation debt issued by the state, as well as the GEFA guaranteed revenue debt. In the Metro Water District Report this amount is estimated to be \$1.27 billion (Metropolitan North Georgia Water District 2003b). We utilize the methodology used in the Metropolitan North Georgia Water District report (2003b), but adjust for higher state revenue figures, as well as a slightly higher interest rate. Therefore, we estimate GEFA general obligation debt issued by the state, as well as the GEFA guaranteed revenue debt to be approximately \$1.5 billion. At 4 percent annual interest rate, this excludes \$60 million due to the debt service restriction.

<sup>16</sup> Georgia is appealing the decision, our analysis assumes the decision is not overturned.

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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conservation measures regardless of the Lake Lanier water allocation outcome. Whatever the final water allocation granted to the Metro Atlanta area from Lake Lanier, it is likely to be less than the currently predicted future need. Given the weakened bargaining position of Georgia after the Water Rights Litigation decision, additional conservation measures are likely to be necessary to appease Alabama and Florida.

In the Water Rights Litigation, the Federal Court found that the Army Corp of Engineers had illegally allocated the waters of Lake Lanier to the Atlanta metropolitan area for water supply. The Water Rights Litigation decision adds a great deal of uncertainty as to the availability of greater quantities of water in the future for the counties of Gwinnett, Forsyth, and Hall. This uncertainty will likely inhibit the growth in these affected counties. Based on the court's decision, we offer several possible scenarios of how the water supply plan might change.<sup>17</sup> In the rest of this section, we will briefly discuss the court case and its outcome, the governor's Task Force recommendations, and some possible changes to the water supply plan.

The issue before the court was whether the Army Corp of Engineers acted within its authority when it reallocated substantial portions of Lake Lanier for water supply for the Metropolitan Atlanta area without congressional approval. The court found the current water allocation by the Army Corps of Engineers to be improper. The judge ruled that the current allocations will be maintained for three years, while parties' workout a settlement and obtain a legal allocation. If no settlement or allocation decision is reached at the end of three years, the court will enforce the last legal allocation from 1975 (Magnuson 2009). That allocation allows 230 MGD from the Chattahoochee River to be used for water supply by the Atlanta metropolitan area downstream from the lake and 10 million MGD for the two cities of Gainesville and Buford authorized by congress to withdraw water from Lake Lanier for water supply. The city of Cumming, Forsyth County, and Gwinnett County would be allocated no water at all from Lake Lanier.

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<sup>17</sup> The wastewater plan will also be affected if population projections and water demand change. However, as the decision only directly affects water allocations we will focus on that in this section.

## An Analysis of Water Related Infrastructure Spending in Georgia

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The permitted allocations as of 2006 were 497 MGD from the Chattahoochee and 214 MGD from Lake Lanier (Magnuson 2009). While it seems unlikely that the Metro Water District will be forced to return to the allocation levels of 1975, it also seems clear that in order to reach an agreement with Florida and Alabama, the Metro Water District plan for water supply will have to be revised. How the ruling in Water Rights Litigation might affect water supply planning in the Metro Water District is highly speculative. However, examining the current water allocation, the proposed future allocations, as well as the 1975 baseline allocation we can offer some guidance.

Table 4 examines the permitted water allocations from the Chattahoochee River and Lake Lanier for 2006, the 2012 baseline allocations from the judge's 1975 baseline allocation, and the Metro Water District's proposed 2035 allocations (Metropolitan North Georgia Water District 2008a). For the water utilities that draw water from the Chattahoochee River, the 2012 allocation in the table is in proportion to the 2006 allocation but with only 230 MGD available to all the utilities. For these water utilities, the baseline 2012 allocation of 230 MGD is 54 percent less than the 2006 amount permitted of 497 MGD.<sup>18</sup> However, for those utilities that draw water directly from Lake Lanier, the 2012 baseline allocation would leave three utilities, city of Cumming, Forsyth County Water Resources, and Gwinnett County Public Utilities with no water at all. For the two cities, Buford and Gainesville, that are congressionally allocated water, the 2012 allocation is in proportion to the 2006 allocations. For these two cities, the 2012 allocation is 69 percent less than the 2006 permitted amount.<sup>19</sup>

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<sup>18</sup> In the Water Rights Litigation, the 2006 amounts of water actually withdrawn from the lake and river are less than the amounts permitted. The court finds that 141 million gallons daily on average were taken from the lake while 377 MGD were taken from the river (In re Tri-State Water Rights Litigation 2009).

<sup>19</sup> The jurisdictions that currently rely on water from Lake Lanier will almost certainly have water even if the 2012 allocations are enforced. This water will most likely come from reallocation of other water sources within the region. However the cost of this new water would likely be quite high and the qualities less than what is currently being taken from Lake Lanier (Water Contingency Planning Task Force 2009).

## An Analysis of Water Related Infrastructure Spending in Georgia

**TABLE 4. PERMITTED MONTHLY AVERAGE WITHDRAWAL (MGD)  
CHATTAHOOCHEE RIVER BASIN**

	-----Year-----		
<b>Chattahoochee River</b>	<b>2006</b>	<b>2035</b>	<b>2012</b>
Cobb County-Marietta Water Authority	87	87	40.3
DeKalb County Water System	140	140	64.8
City of Atlanta Watershed Management	180	180	83.3
Atlanta-Fulton County Water Resources	90	116	41.6
Total Permitted Monthly Withdrawal	497	523	230.0
	-----Year-----		
<b>Lake Lanier</b>	<b>2006</b>	<b>2035</b>	<b>2012</b>
City of Cumming	18	27	0.0
Forsyth County Water Resources	14	51	0.0
Gwinnett County Public Utilities	150	169	0.0
City of Buford	2	3	0.6
City of Gainesville Public Utilities	30	53	9.4
Total Permitted Monthly Withdrawal	214	303	10.0

Source: Metropolitan North Georgia Water District (2008b), Magnuson (2009) and author's calculations.

The projected growth in water demand in 2035 is also larger for the Lake Lanier utilities. For 2035, the total increase in demand is projected to be 89 MGD for the five water utilities that draw water directly from Lake Lanier. All five utilities are projected to require more water by 2035. Forsyth County's water resource utility is expected to require the most, with an additional 37 MGD by 2035 (Metropolitan North Georgia Water District 2008a). In contrast, the four utilities that draw water from the Chattahoochee River are projected to increase water demand by only 26 million gallons daily by 2035. This increased demand comes from only one utility, Atlanta Fulton County Water Resources (Metropolitan North Georgia Water District 2008a).

It is beyond the scope of this report to analyze in detail how the Water Rights Litigation ruling will affect future water supply planning in the Metro Water District. However, a basic tenet of bargaining theory offers some guidance. Bargaining theory suggests that parties will take positions in negotiations based on some concept of what they can hope for if negotiations fail (see, Snowden (2005) for a thorough

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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discussion). Assuming the court's decision is upheld, Georgia, Florida and Alabama know exactly what to expect if good faith negotiations fail.<sup>20</sup> That result would be essentially untenable to Georgia. Thus, it is rational for Georgia to do everything in its power to reach an agreement before the three-year deadline expires.

Given this weakened bargaining position, it seems clear that substantial future growth in the Metro Water District's water supply will likely come from increased conservation efforts. Proposed new storage facilities already in the 2008 water supply plan account for only 21.4 MGD of new supply in the Chattahoochee basin, only 2.6 percent of the 826 MGD estimated for water supply need in 2035 (Metropolitan North Georgia Water District 2008a).<sup>21</sup> Given the cost of new reservoirs as well as the difficulty of siting these facilities, it seems unlikely that any new storage facilities with substantial capacity will be built. Another result is that development is likely to shift away from counties that would be affected by the 2012 baseline allocation until the water allocations are decided. The Metro Water District's need for increased conservation is supported by the recent report issued by the Water Contingency Planning Task Force (2009).

The Governor created the Water Contingency Planning Task Force (Task Force) to analyze the potential water shortfall in Georgia in light of Water Rights Litigation, and to develop a contingency plan. The Task Force made several recommendations. First, the Task Force recommended that increasing conservation should be a high-priority regardless of the outcome of the Lake Lanier reauthorization efforts. Second, even if the reports most stringent conservation measures were to be mandatorily implemented by 2012, the Metro Water District area would still face a significant water supply shortfall if the 2012 Water Rights Litigation ruling were to take effect. The Task Force found no acceptable water supply alternative to the authorization of Lake Lanier for water supply for the Metro Water District area prior

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<sup>20</sup> If either Florida or Alabama were to take a very hard line approach and the negotiations were to fail Congress could step in and try to forge a solution.

<sup>21</sup> Even if all the proposed six reservoirs from the 2008 plan are built, this adds an additional 108.4 MGD, spread through the entire district. However, only two facilities are currently in the permitting process (Metropolitan North Georgia Water District 2008a).



## **An Analysis of Water Related Infrastructure Spending in Georgia**

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to 2012. Third, the earliest that a potential alternative solution to using Lake Lanier for water supply would be viable is 2015, however this option is very expensive.

The Task Force identified two water supply options as viable contingencies to Lake Lanier. The 2015 contingency plan consists primarily of an indirect potable reuse project, along with the conservation measures. The 2015 solution would require significant upfront capital expenditures of approximately \$3 billion for the necessary pumps, pipes, and related infrastructure to capture water downstream from Atlanta and pump it back up to Lake Lanier.<sup>22</sup> The report recommends that the 2015 solution not be pursued due to its high costs and difficult implementation unless it is absolutely required. A second contingency plan was identified with an estimated completion date of 2020. The 2020 plan relies on conservation as well, but increases the Metro Water District water supply through reservoir expansion rather than the indirect potable reuse option.<sup>23</sup> The 2020 contingency plan would require roughly \$1.7 billion in upfront capital (Water Contingency Planning Task Force 2009).

The Task Force's conclusions are clear; the authorization of Lake Lanier for water supply is the only option available to the Metro Water District before 2015. As was noted earlier, this option relies heavily on successful negotiations with Florida and Alabama. Also, increased conservation is a key component of any plan going forward. However, the governor's recent signing of House Bill 406 calls into question whether the Task Force's recommendations will be heeded.

House Bill 406 allows for the Bear Creek reservoir project to move forward. Building a more expensive and less water efficient reservoir at Bear Creek seems to conflict with the Task Force's suggested expansion of the existing reservoir at nearby Dog River. The Task Force estimated that a MGD of water from the Bear Creek reservoir might cost up to twice as much as the same amount generated from the expansion of the Dog River reservoir (Water Contingency Planning Task Force, [Appendix III] 2009 and Harrison 2010). In addition, since the reservoir at Bear

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<sup>22</sup> The conservation measures are estimated to cost \$100 million to implement by 2012. This includes \$40 million to fund increased rebate programs (Water Contingency Planning Task Force 2009).

<sup>23</sup> The 2020 plan calls for the expansion of two existing reservoirs at Tussahaw Creek and Dog River, and a new reservoir at Richland Creek (Water Contingency Planning Task Force 2009).

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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Creek would require large amounts of water to be withdrawn from the Chattahoochee River, it could be perceived by Alabama and Florida as an unfavorable development in the Water Rights Litigation.<sup>24</sup> The implications of the Task Forces report and House Bill 406 on the outcome of Lake Lanier water supply authorization remain to be seen.

We can only speculate on how the new trend in population growth and new conservation efforts will affect the cost of water supply infrastructure. Greater conservation efforts will likely add cost to the Metro Water District's water supply plans in the earlier years. However, there are likely to be savings realized in later years by not expanding additional water supply infrastructure into outlying counties that currently do not have it. The net change in the cost of the water supply plan, measured over the full 30 year planning horizon, will depend on the magnitude of these two opposing effects.

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<sup>24</sup> This is the position taken by Upper Chattahoochee Riverkeeper (Harrison 2010). However, in a statement issued from the governor's office, the claim is made that Florida and Alabama are aware of the Bear Creek project and House Bill 406 and have no objections (Peters 2010.)

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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### **IV. Stormwater Cost Estimates**

In this section, the cost to the Metro Water District for stormwater maintenance and infrastructure for the period 2010-2030 is estimated. The current stormwater funding mechanisms in the Metro Water District is also reviewed. We estimate the total Metro Water District stormwater infrastructure costs based on per capita stormwater expenses from the 2008 Metro Water District report and on county level impervious surface. This method yields cost estimates of \$3.2 billion-\$5.5 billion for the Metro Water District for the period 2010-2030.

#### **Current Funding Methods**

A consistent criticism of the Georgia stormwater management program is that it is underfunded (see Metropolitan North Georgia Water District 2008c as well as American Society of Civil Engineers 2009). One of the reasons stormwater maintenance and infrastructure is underfunded is that in most places funding is out of property tax collections and it must compete with other local government expenses such as public safety and education (Metropolitan North Georgia Water District 2008c). An alternative to this funding method is to use stormwater utilities. These function similarly to water utilities, charging a monthly fee based on stormwater services utilized. The revenue generated goes to stormwater management, such as maintaining stream banks, as well as capital projects. Several Georgia communities have created stormwater utilities. These include the counties of Gwinnett, Clayton, and Columbia, and the cities of Griffin, Decatur, and Peachtree City. The city of Decatur has the highest charge of \$6.25 per month while the city of Griffin charges the least at \$2.95 per month (City of Decatur 2010, Keller 2003). The stormwater utility fee can also be based on the square footage of impervious surface of a property. For instance, the county of Gwinnett charges \$2.46 per hundred square feet of impervious area annually while the county of Columbia charges \$1.08 per hundred square feet of impervious area annually (Gwinnett County Public Utilities 2006,

## An Analysis of Water Related Infrastructure Spending in Georgia

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Columbia County 2010).<sup>25</sup> The Metro Water District report encourages the formation of stormwater utilities and considers them an important step in securing proper funding for stormwater maintenance and infrastructure (Metropolitan North Georgia Water District 2008c). Estimates of future infrastructure and compliance costs for stormwater are examined next.

### Stormwater Future Costs

We were unable to find an estimate for the total cost of needed stormwater infrastructure improvements for the Metro Water District.<sup>26</sup> Neither the 2003 nor the 2008 Metro Water District stormwater reports estimate the cost of stormwater infrastructure. The 2008 Metro Water District stormwater update provides per capita estimates of various cost components of the stormwater program. The cost estimates as well as the percentage of county acres of impervious surface from the United States Geologic Survey are used to estimate the cost of the stormwater program from 2010 to 2030.

#### *Per Capita Costs*

In the 2008 Metro Water District stormwater report, estimates are included for per capita stormwater implementation for local governments. The list includes costs for legal authority, watershed planning, land development, asset management, pollution prevention, watershed conditions assessment, education and public awareness, and resource specific measures. The Metro Water District report estimated per capita costs for three levels of stormwater service: low, \$6.32; medium, \$20.53; and high, \$34.74. The per capita medium stormwater service level costs are examined for illustrative purposes (see Appendix B for details).

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<sup>25</sup> The other stormwater fees area as follows: Peachtree City has a three-tiered plan ranging from \$2.67 to \$6 per month per household (Peachtree City 2006). Clayton County charges \$3.75 monthly residential fee (Clayton County Water Authority 2010).

<sup>26</sup> The only estimate found, \$500 million, was from the 2003 ASCE Report Card on Georgia Infrastructure. However, this estimate was only for regulatory compliance and did not include infrastructure costs.

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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Per capita itemized costs vary substantially. Costs range from \$0.29 for education and public awareness to \$14.55 for asset management. The asset management figure of \$14.55 represents 71 percent of the total medium per capita estimated cost for stormwater management and infrastructure of \$20.53. It is likely that the \$14.55 for asset management does not include all maintenance elements or any capital improvements. Asset management includes five subcategories: stormwater infrastructure inventory, extent and level of service, policy inspections, maintenance, and capital improvement programs. The local government implementation of the maintenance program is not scheduled to begin until 2010. The capital improvement program is scheduled to start in 2011 (Metropolitan North Georgia Water District 2008c). Thus, it is unclear if the per capita costs for asset management include costs for programs, infrastructure, and maintenance that have not yet been identified by local governments. These per capita costs are used later to estimate county level future stormwater costs.

The costs of some local measures and activities do not lend themselves to per capita estimation (Metropolitan North Georgia Water District 2008c and see Appendix B for details). These include floodplain delineation, certain maintenance elements, capital improvements, as well as watershed improvements. The range of costs for these elements is substantial; examining the medium service level, the costs range from \$0.35 for inlet cleaning to \$92,500 per pond acre to retrofit a wet pond (Metropolitan North Georgia Water District 2008c). These maintenance and capital improvement cost will vary substantially per jurisdiction. The total per capita asset management estimates weighted by impervious surface area are used as a proxy for these costs. The role of impervious surface is discussed next in estimating stormwater costs.

## An Analysis of Water Related Infrastructure Spending in Georgia

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### *Impervious Surface*

The percent of total county acres that are classified as impervious surface are an important indicator of future watershed health.<sup>27</sup> Impervious surface is defined as those areas where water is prevented from filtering into the ground, such as rooftops and paved areas. Higher levels of impervious surface in a watershed lead to higher volumes of stormwater that flow into the watershed's streams and rivers. Increased stormwater flows can contribute to significant declines in water quality and stream conditions. They also increase the cost of water treatment. Healthy watershed conditions can be sustained if the impervious surface area in a watershed is limited to approximately 10 percent (Metropolitan North Georgia Water District 2003a).

For those watersheds in the Metro Water District with greater than 10 percent impervious surface, stormwater restoration and retrofitting may be needed. Approximately 20 percent of watersheds in the district will likely need restoration based on the levels of impervious surface (Metropolitan North Georgia Water District 2008c). As the per capita and individual item costs indicate above, watershed retrofitting and restoration is costly.<sup>28</sup> This retrofitting is necessary predominantly in the five core urban counties of Clayton, Cobb, DeKalb, Fulton, and Gwinnet (Metropolitan North Georgia Water District 2003a).

Table 5 lists the percentage of total county impervious surface for 1991, 2001 and 2005. The acres per year converted to impervious surface in the periods 1991-2001 and 2001-2005 are also documented (Kramer 2008). Total county area in acres is included to give these changes some perspective. For instance, Clayton County is a small county with the large Hartsfield-Jackson International Atlanta Airport located within its borders. This has a dramatic effect on the percent of total impervious

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<sup>27</sup> Watershed health is a term used to describe how well a developed area has maintained its hydrologic functions. Biological Indicators are often used to ascertain watershed health. The presence, condition, and numbers of the types of fish, insects, algae, plants and other aquatic life can provide accurate information about the health of a specific water body such as a river, stream, and lake (Environmental Protection Agency 2010).

<sup>28</sup> The City of Atlanta's West Area Combined Sewer Overflow Tunnel, part of the combined sewer overflow (CSO) restoration program effectively addresses many of the recommendations for watershed improvement and retrofitting that reduce stormwater volume and water quality changes and pollution. The cost of the tunnel is estimated to be \$190 million (Shelton 2008).

## An Analysis of Water Related Infrastructure Spending in Georgia

**TABLE 5. COUNTY LEVELS AND CHANGES IN IMPERVIOUS SURFACE**

County	Total County Acres	% of Total County Acres Impervious -----Surface-----			<u>Change in Impervious Surface</u>	
		1991	2001	2005	1991-2001 Acres/Yr	2001-2005 Acres/Yr
Clayton	92,488	14%	20%	25%	518	1138
DeKalb	173,622	14%	18%	22%	800	1657
Cobb	220,903	10%	16%	20%	1388	2109
Gwinnett	279,817	7%	15%	19%	2099	3043
Fulton	342,763	10%	15%	19%	1726	2852
Douglas	84,659	4%	7%	9%	275	824
Rockdale	128,447	3%	6%	8%	214	430
Fayette	207,937	2%	4%	7%	357	592
Henry	127,753	2%	5%	7%	495	1594
Forsyth	158,519	2%	5%	7%	527	698
Cherokee	274,917	2%	4%	5%	457	898
Hall	278,236	1%	3%	4%	394	656
Paulding	202,119	1%	2%	4%	212	945
Bartow	286,063	1%	3%	4%	261	711
Coweta	301,830	2%	3%	3%	377	812
Walton	211,396	1%	2%	3%	164	439

Source: Kramer (2008) and author's calculations.

surface for Clayton County, as well as its future prospects for increased acreage of impervious surface.

The counties are listed from highest to lowest for percentage of acreage of impervious surface. The five core urban counties all have a level of impervious surface greater than 10 percent. Clayton County has the greatest percentage with 25 percent, while Fulton County has the smallest percentage of impervious surface with 19 percent. Six counties have impervious surface levels of 5 percent or less. In this group Cherokee, Hall, and Paulding all have 5 percent of their total area classified as impervious surface. Walton County has the least with only 3 percent. The counties in the middle range have from 7 percent to 9 percent of their total area classified as impervious surface. The two small counties of Rockdale and Douglas both have 9 percent impervious surface (see Table 5). All counties experienced increases in impervious surface from the period 1991-2001 to 2001-2005. Gwinnett County

## An Analysis of Water Related Infrastructure Spending in Georgia

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converted the greatest amount of acreage per year to impervious surface, with 3,043 acres annually. Paulding County has seen the greatest percentage increase in conversion acres, 346 percent.

Counties with higher levels of impervious surface are assumed to have higher per capita stormwater costs. The information in Table 5 is used to assign per capita service-level cost estimates from the Metro Water District Report (Metropolitan North Georgia Water District 2008c). The Metro Water District estimates that counties with 10 percent or greater impervious surface area will need some type of remediation and retrofitting to allow for proper stormwater control and management.

For those counties below the 10 percent impervious surface threshold, we estimate the number of years before they reach the threshold based on the 2001 through 2005 conversion rates.<sup>29</sup> For example, in Hall County, with 12,810 acres of impervious surface in 2005 and a conversion rate of 656 acres per year, it will take approximately 22 years for it to reach the 10 percent threshold. Counties that will reach the threshold in 10 years or less are assigned the medium level per capita surface costs. Counties that will reach the threshold in more than 10 years are assigned the low level of per capita stormwater costs. Those already above the threshold are assigned the high-level stormwater per capita costs.<sup>30</sup>

In Table 6, counties are grouped by the percentage of total acres of impervious surface. As discussed earlier, there is likely to be large variation per county for facilities that are not included in the per capita estimates. To incorporate this variation, an additional asset management fee is added, labeled “Per capita + maintenance,” in Table 6 to generate the high cost estimates. For example, in the high cost counties an additional \$26 asset management fee is added to the per capita cost of \$34.74. Thus, for Clayton County the annual cost for stormwater management and

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<sup>29</sup> The 2008/2009 recession likely slowed this rate considerably going forward, however, as this is the most accessible data we have to work with, we will maintain our assumptions.

<sup>30</sup> Rockdale, Douglas, and Henry County all would exceed the threshold in three years or less based on this calculation. Thus as of this writing in 2010, they would have impervious surface over the 10 percent level. We maintain our assumption of medium cost levels, as these counties will have had the benefit of stormwater planning and management. It is assumed; these counties will not require extensive future retrofitting due to poorly planned stormwater systems and practices.



## An Analysis of Water Related Infrastructure Spending in Georgia

**TABLE 6. COUNTY STORMWATER COSTS**

County	Per Capita Chrg	-----Total Annual Cost-----	
		Per Capita Only	Per Capita + Maint.
Clayton	\$34.74	\$10,044,324	\$17,561,665
DeKalb	\$34.74	\$26,984,113	\$47,179,476
Cobb	\$34.74	\$25,117,263	\$43,915,445
Gwinnett	\$34.74	\$30,926,330	\$54,072,115
Fulton	\$34.74	\$36,281,084	\$63,434,457
Douglas	\$20.53	\$3,540,984	\$6,050,546
Rockdale	\$20.53	\$2,275,227	\$3,887,723
Fayette	\$20.53	\$2,783,283	\$4,755,848
Henry	\$20.53	\$5,772,030	\$9,862,777
Forsyth	\$20.53	\$5,914,714	\$10,106,583
Cherokee	\$6.32	\$1,782,177	\$2,656,346
Hall	\$6.32	\$1,804,363	\$2,689,415
Paulding	\$6.32	\$1,780,448	\$2,653,769
Bartow	\$6.32	\$1,176,071	\$1,752,942
Coweta	\$6.32	\$1,027,899	\$1,532,090
Walton	\$6.32	\$1,029,639	\$1,534,683
District Total		\$3,164,798,953	\$5,472,917,602

Source: Metropolitan North Georgia Water District (2008c) and author's calculations.

infrastructure is estimated to be approximately \$10 million-\$17.6 million. The method is repeated for the counties in the low and medium category of per capita cost asset management fees of \$3.10 and \$14.55 respectfully.

By summing the county costs, we can estimate a high and low range for stormwater cost for the Metro Water District over the 20-year period 2010 to 2030. The low cost estimate is approximately \$3.2 billion; the high cost estimate is approximately \$5.5 billion. An estimate can be made of the monthly average household stormwater utility fee necessary to cover these costs, using the annual per capita cost estimates. For counties requiring high service levels, the monthly stormwater fee is between \$8 and \$14. For counties requiring a medium service level, the stormwater fee is between \$5 and \$8. For counties with low service requirements, the fee is between a \$1.50 and \$2.20.

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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These are very crude estimates and rely on some arbitrary assumptions we made regarding county service levels. Another method of estimation might be to use the range of current stormwater utility fees to estimate total district costs over the 20-year period. Using the average district population in the period of 6.1 million, and the range of stormwater utility rates of \$3-\$7 per month, the estimated cost to the district is approximately \$1.6 billion-\$3.6 billion. The low estimate of \$1.6 billion assumes all counties and cities charge three dollars per household per month for stormwater fees. This figure seems too low, as some urban counties currently charge more. For instance, Gwinnett County charges over \$7 per month for large homes. Even the high estimate does not seem adequate. The high impervious surface area counties of Clayton, DeKalb, Cobb, Gwinnett, and Fulton all will need to engage in substantial stormwater retrofitting which is likely to be expensive. Thus, the initial fee of \$7 per month will likely need to be increased over time. These five counties are estimated to be home to approximately 61 percent of the Metro Water District population over the projected period 2010 to 2030. Therefore, it seems likely that the higher costs in these counties will offset lower costs in counties with lower impervious surface and thus lower costs. While our per capita cost estimation method is crude, yielding a cost range of \$3.2 billion-\$5.5 billion, it would seem to be a useful starting point for stormwater infrastructure costs in the Metro Water District in the period 2010 to 2030.

### **Hidden Costs: Litigation and Federal Total Maximum Daily Loads**

Stormwater infrastructure is not likely to be as expensive as wastewater or water supply. However, stormwater regulation may have a hidden cost for local governments: litigation. Stormwater differs from wastewater and water supply in that the costs are not borne uniformly by residents, due to buffer zones and setback requirements. To properly implement stormwater management, local governments will have to enforce land use controls that are likely to be unpopular with many landowners currently in the less populous counties.

It was stream buffers and other environmental requirements that motivated state legislators from the Metro Water District to propose Senate Bill 30 in 2006

## An Analysis of Water Related Infrastructure Spending in Georgia

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(Peters 2005). Senate Bill 30 would have made it easier for property owners in Georgia to collect compensation due to laws and regulations that diminished the value of their real property (Peters 2005). Under Senate Bill 30, these regulations and controls could be construed as a regulatory taking, requiring compensation under the Fifth Amendment of the US Constitution (Bluestone 2007). Senate Bill 30 did not pass. However, the environmental rules requiring setbacks and stream buffers, for which the bill would have required compensation for, have been adopted throughout the Metro Water District. Jurisdictions representing the major population centers of the Metro Water District have adopted the model stormwater ordinances put forth by the Metro Water District.<sup>31</sup> The model ordinance includes stream buffers and setback provisions that range from 50-150 feet depending on how close the property is to a reservoir and the size of the water supply (Metro Water District 2008 report update).<sup>32</sup> The sentiment behind SB 30 is likely still present in the legislature as well as the constituents of the affected counties. Thus, with the actual passing of these model ordinances and the adoption of setback requirements the bill or one similar could be resurrected.

The data and methods in “Property Rights Reform: A Fiscal Analysis,” Bluestone (2007) are used to estimate the first-year cost to the Metro Water District of litigation spawned by enforcement of the stormwater ordinances and regulations should such enforcement be deemed a potential regulatory taking. The estimate is based on the amount of damages, the number of claims filed, and the cost of litigation expenses generated from those claims (see Appendix C for a county breakdown). Due to the high cost of filing claims, as well as litigation costs, landowners estimated net

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<sup>31</sup> All jurisdictions in the District were required to adopt the model stormwater ordinances by 2006. A November 2008 survey of 99 jurisdictions representing more than 95 percent of the districts population found the following: 60 have adopted and implemented the four model ordinances for post development stormwater, illicit discharge, floodplain management, and stream buffers. 35 jurisdictions did not reply to the survey and 4 have failed to adopt one of the above ordinances. Conyers has not adopted the illicit discharge ordinance, while; Union City, Hapeville, and Pine Lake have not adopted the Floodplain Management ordinance (Metropolitan North Georgia Water District 2008c).

<sup>32</sup> A stream buffer is a natural or enhanced vegetated area, in which no land-disturbing activities are allowed. A setback is an area in which no impervious surface can be constructed. For large water supply watersheds, streams within a 7 mile radius of the reservoir boundary must adhere to the more stringent rules for stream buffers and setbacks (see Metropolitan North Georgia Water District 2008c and Metropolitan North Georgia Water District 2003c).

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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cost would be roughly \$87 million. The state and local governments of the Metro Water District would incur an estimated net cost of approximately \$154 million to defend against these claims, as well as pay awards to claimants. The claimants' awards of approximately \$42 million represent 27 percent of the state's total net cost. Unlike physical infrastructure, local governments would not be able to use bond revenue to pay for these claims and litigation expenses; they would likely be paid from general revenue. This could be problematic for local governments, particularly those already constrained by property tax assessment limitations.

In addition to stream buffers and setbacks, local governments must comply with the federal clean water act, which requires the calculation of Total Maximum Daily Loads for all covered water bodies. A Total Maximum Daily Load (TMDL) is the maximum amount of a pollutant that a water body can receive and still meet water quality standards. The Metro Water District has 2,155 miles of rivers and streams that do not meet water quality standards (Metropolitan North Georgia Water District 2008c).<sup>33</sup> The TMDL process requires local governments to monitor and determine significant sources of pollution. Management practices and activities must also be determined that will allow the listed rivers and streams to meet water quality standards. Future plans to monitor progress toward TMDL goals and conduct necessary remediation are ongoing.

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<sup>33</sup> Section 303(d) of the Clean Water Act requires that all states list water bodies that do not meet water quality standards (Environmental Protection Agency 2010). The Georgia Environmental Protection Division publishes a list of streams that do not meet state water quality standards (Environmental Protection Division 2010). While progress has been made in cleaning up listed waterways, additional waterways are added as more TMDL assessments are completed.

### **V. Wastewater and Supply Cost Estimation for the other 143 Georgia Counties**

In 2008, the Georgia passed comprehensive water planning legislation for the rest of the state. This legislation is similar to that which created the Metro Water District and requires similar plans to be done by regions. No cost estimates have yet been developed for the remainder of the state. We utilize the cost estimates from the Metro Water District to estimate costs for water supply and wastewater treatment for the urban counties in Georgia that are not in the Metro Water District. We also discuss the potential impact on these urban counties of watershed management. However, due to the differences in geographic as well as the dispersion of all the non-Metro Water District urban counties, we can make no estimate as to the cost of future watershed management infrastructure. All the urban counties not in the Metro Water District are aggregated for ease of presentation. Rural counties are not likely to face substantial water related infrastructure costs due to lack of population growth, low population densities, as well as the preponderance of agricultural water use. The likely water policy response for rural counties and its implications for state taxpayers are also discussed. For those urban counties not in the Metropolitan Atlanta area, the estimated cost for a comprehensive water plan that includes improvements to water treatment as well as water supply facilities is \$5.1 billion-\$7.2 billion. This estimate includes all capital expenses and operation and maintenance from 2010-2020.<sup>34</sup>

#### **Rural Georgia**

Water policy and infrastructure spending are likely to be different in urban and rural counties. It is not practical to estimate the cost of water supply and wastewater infrastructure required in the future for rural counties in Georgia. A county is considered an urban county in the remainder of the state if the 2015 estimated population is above 50,000. We add five additional counties with rapidly growing populations that the Census includes in their Metropolitan Statistical Area

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<sup>34</sup> Georgia population estimates for counties exist for only 2010 and 2015. We assume the same population growth in the period 2015-2020 as is estimated to occur from 2010-2015. Due to the limitations of the data, we are unable to estimate costs to 2030 as is done for the Metro Water District.

## An Analysis of Water Related Infrastructure Spending in Georgia

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(MSA) definitions.<sup>35</sup> Rural Georgia counties differ from the urban counties in several important respects. First, rural counties are sparsely populated, making large central water supply and treatment facilities impractical. Second, the populations of many rural counties is not growing, thus the need for public water supply is not likely to increase dramatically over time. Third, the mix of water usage in rural counties is different from that in urban counties. For the purposes of water infrastructure, 46 Georgia counties are categorized as urban; sixteen of these are in the Metro Water District. The remaining 113 counties are classified as rural. Rural counties are in various geographical regions throughout the state. In order to analyze these rural and Non-Atlanta Metro Water District counties, county level water data are used from the United States Geological Survey report for Georgia (Fanning and Trent 2009).

The difference in water use in urban and rural counties is likely to affect who ultimately pays for infrastructure that aids in conservation and efficient water use. The United States Geological Survey tracks water usage by six categories: public supply, domestic and commercial, industrial and mining, irrigation, livestock and thermo-electric. The biggest difference in water usage between urban and rural counties in Georgia is in the categories of irrigation and public supply. In the rural counties approximately 24 percent of total water use is for irrigation, while approximately 9 percent is for public supply. For urban counties, approximately 4 percent of total water use is for irrigation and 34 percent is for public supply. It is likely that the state will work closely with Georgia's agricultural sector to minimize the private cost of the necessary efficiency measures for irrigation use to keep the agricultural sector competitive in the global economy (See Vinson Institute 2006).<sup>36</sup> Thus, the cost of the water plan in rural counties as it affects the agricultural sector is likely to be borne by all Georgians in the form of higher taxes or fees. It is beyond the scope of this report to estimate what the costs of these agricultural conservation measures might be.

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<sup>35</sup> Madison and Oconee county are part of the Athens MSA, Bryan county is part of the Savannah MSA, Lee county is part of the Albany MSA, and Pickens county is part of the Atlanta MSA.

<sup>36</sup> These methods are likely to be relatively inexpensive as compared with urban water conservation methods. Solutions for agricultural conservation such as water auctions, employing best management practices, changing irrigation methods, or working on efficiency are estimated to be achievable at relatively low costs (Vinson Institute 2006).

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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### **Power Plant Usage**

The greatest category of water usage in Georgia is from thermoelectric power, accounting for approximately 51 percent of all water usage in the state. Although much of the water returns to the states watersheds, some of that usage is consumptive. Estimates vary by plant, but for some of the larger plants in Georgia consumptive use is estimated to be between 30 and 50 percent (Barczak and Kilpatrick 2003). The state of Georgia will have to work closely with Georgia Power, the owner and operator of these plants, to reduce this consumptive use in both urban and rural counties. For instance, Arizona requires industrial users and power plants to reuse water in single pass cooling or heating (Vinson Institute 2006). However, as long as Georgia Power is a regulated power provider, whatever additional costs are incurred to improve water conservation will likely be passed on to state power consumers in the form of higher rates.<sup>37</sup> Again, it is beyond the scope of this report to go into detail of what might be done in the thermoelectric power generation category to conserve water. However, it is worth noting the link between water conservation and energy conservation. In this instance, the state, through effective planning and technology use, could help its citizens to conserve electricity, which would also conserve water.<sup>38</sup>

### **Metropolitan Counties not in the Metro Water District**

Water policy and infrastructure spending are likely to be different in urban and rural counties. It is not practical to estimate the cost of water supply and

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<sup>37</sup> There are important distinctions in the regulation of the retail and wholesale markets for electricity in Georgia. The retail market is regulated by the Georgia Public Service Commission, which fully regulates the retail power provision of Georgia Power Company. Limited retail competition has been present in Georgia since 1973 with the passage of the Georgia Territorial Electric Service Act. This Act enables customers with manufacturing or commercial loads of 900 kW or greater a onetime choice in their electric supplier (Georgia Public Service Commission 2010). The wholesale market for electricity has been deregulated generally by federal legislation. As Georgia's electricity rates are generally below the national average, the wholesale market for electricity among states does not seem to be exerting much influence on the statewide electricity market.

<sup>38</sup> Georgia Power Company reduced total withdrawals for thermoelectric-power generation by about 24 percent in 2005 compared to 2000. This savings was accomplished by the decommissioning of three power plants in the state, as well as retooling several other plants during this period to increase water conservation (Fanning and Trent 2009).

## An Analysis of Water Related Infrastructure Spending in Georgia

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wastewater infrastructure required in the future for rural counties in Georgia.<sup>39</sup> Thus we only have cost estimates for the 16 counties that originally comprised the Metro Water District of Georgia. To estimate the cost of additional wastewater and water supply infrastructure for Georgia counties not in the Metro Water District, counties in the Metro Water District are matched with urban counties throughout the state with similar population estimates, and when possible, that are geographically similar. Seven Metro Water District counties are designated matching counties, they are: Douglas, Fayette, Walton, Henry, Paulding, Hall, and Bartow. Recall, to qualify as an urban county in the remainder of the state, the 2015-estimated population must be above 50,000. The Metro Water District cost assumptions are used for cost per capita for operation and maintenance and water supply and wastewater conveyance costs.

To estimate the costs for the non-Metro Water District urban counties, we use the average cost for additional sewer capacity as well as the average additional capacity required per additional unit of population. Population growth from 2010 to 2015 is used to determine the new sewer capacity per thousand new residents, as well as cost for this new capacity in the area.<sup>40</sup> For example, Douglas County is expected to grow by 12,543 people between the years 2010 and 2015 (Georgia Statistics System 2010). To accommodate this growth, Douglas County is expected to add 4.72 MGD to existing facilities from 2010-2015 at an estimated cost of \$12 billion (Metropolitan North Georgia Water District 2003b). We calculate the cost per MDG added which is, \$2.54 billion per each new MGD of capacity. We also calculate the amount of MGD added per unit of population, which is approximately 0.37 MGD of county wastewater capacity per new thousand county residents. Using the seven Metro Water District counties listed above, a range of estimates is generated for costs for each new MGD of capacity as well as the amount of capacity in MGD needed per new thousand county residents. In our estimation procedure, we choose three observed values for each category, designated low, medium, and high. These values

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<sup>39</sup> The state plan requires the regional water districts to generate facility recommendations and estimates of need based on projections from 10 to 40 years into the future (Water Council 2008). It is unclear from the plan when the regional districts are supposed to have these recommendations completed.

<sup>40</sup> All itemized costs are in 2002 dollars we convert to 2008 dollars in Table 7 to be compatible with the Metro Water District. The unit for additional sewer capacity is MGD.



## An Analysis of Water Related Infrastructure Spending in Georgia

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are used to calculate a matrix of expected costs based on cost per MGD as well as MGD per thousand new county residents. The range for costs per MGD is \$2.54 million-\$6 million. The observed middle value is \$3.98 million. The range in amount of capacity in MGD needed per additional thousand in county population is 0.186 MGD-0.57 MGD. The observed middle value is 0.376 MGD.

Infrastructure cost is estimated using the low, medium and high costs per MGD added as well as a range of additional MGD needed per thousand new residents. This allows for different conditions that might exist in urban counties outside the Atlanta area. The costs for the 30 urban counties are estimated from 2010-2020.<sup>41</sup> In our low cost estimate, we reduced conveyance costs by 50 percent of Metro Water District amounts to account for potential lower costs in these areas. The same operation and maintenance costs are assumed as for the Metro Water District. The costs of water supply infrastructure are estimated to be 40 percent of wastewater infrastructure from Table 2.

**TABLE 7. NON-METRO WATER DISTRICT URBAN COUNTY WATER INFRASTRUCTURE COSTS**

	<b>Low Cost*</b> <b>2010-2020</b>	<b>Hi Cost*</b> <b>2010-2020</b>
Treatment Facilities Capital Total Cost	\$536	\$1,647
Conveyance Facilities Capital Total Cost	\$1,476	\$2,953
Operations & Maintenance Costs	\$4,055	\$4,055
Total Cost	\$6,068	\$8,655

\*In millions of 2008 dollars.

Source: Metropolitan North Georgia Water District (2003b,c) and author's calculations.

Table 7 lists the costs for the different types of infrastructure needed to accommodate future population growth in Georgia's urban areas outside the Metro Water District. The cost estimates for the total infrastructure cost for urban counties outside the Metro Water District range from \$6.1 billion to \$8.7 billion. Infrastructure expenditures for wastewater treatment and water supply are \$536

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<sup>41</sup> We do not calculate or estimate expenses from 2005 to 2010. It is likely that urban counties without a plan in place are further behind in the build out of wastewater and water supply infrastructure than Metro Water District counties that have had a plan in place since 2003.

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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million for the low cost estimate and \$1.647 billion for the high cost estimate, while capital expenditures for conveyance are \$1.476 billion for the low estimate, and \$2.953 billion for the high cost estimate.<sup>42</sup> Operation and maintenance expenses of approximately \$4.055 billion comprised 67 percent of the low cost estimate and 47 percent of the high cost estimate. These operation and maintenance expenses will most likely carry over into the 2020-2030 period. Thus, even if the urban counties experienced no additional capital expenditure requirements, they will still be spending approximately \$4.055 billion on operations and maintenance from 2020-2030.

### **Stormwater outside Metro Water District**

The difference in geography, as well as dispersion throughout the state, makes estimating the cost of watershed management impractical in the non-Metro Water District urban counties. For instance, an urban county on the Georgia coast, such as Chatham County (home to city of Savannah), will have different watershed management requirements than a county in the north Georgia mountains, such as Whitfield County (home to city of Dalton). However, several general points can be made. First, these other urban counties are likely to have less impervious surface than the Metro Water District counties. For instance in 2005, Chatham County had 5 percent impervious surface; Bibb County, home to Macon, had 9 percent impervious surface; Richmond County, home to Augusta, had 10 percent impervious surface (Kramer 2008). This is in contrast to the five core counties in the Metro Water District which had impervious surface levels of 19 percent and higher in 2005 (Kramer 2008).

Second, lower levels of impervious surface in these urban counties outside Atlanta will likely lead to lower stormwater infrastructure costs than in the Metro Water District. In the Metro Water District, the estimated stormwater infrastructure cost was 4 percent to 7 percent of the total water supply and wastewater infrastructure

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<sup>42</sup> We assume the same population growth for the period 2015-2020 as is estimated by the Census for 2010-2015 to estimate the cost of additional wastewater and water supply capital. For the operation and maintenance estimate the Census projections for 2010 and 2015 are used.

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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costs. This high cost is due primarily to high levels of impervious surface, more than 19 percent, in the five core counties in the Metro district. For instance, If one assumed the same percentage range as the Metro Water District, 4 percent to 7 percent of water supply and wastewater infrastructure costs, then the cost of watershed management in the rest of the urban counties might be \$244 million-\$609 million. This range of estimates is likely too high, as mentioned earlier due to the lower levels of impervious surface.

Several other issues make estimation of costs impractical. Currently no plan is in place for stormwater infrastructure. It is possible that costs could rise, if counties wait too long to address the problem. These urban counties will also have to comply with federal TMDL requirements. In addition, land-use regulation could trigger litigation if Georgia property rights regulatory regime were to change.

## An Analysis of Water Related Infrastructure Spending in Georgia

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### VI. Conclusion

In this section, we summarize our cost estimates for both Metro Water District and the rest of urban Georgia. To make comparisons across districts and time easier, we present only figures for the period 2010-2030 in Table 8. It is our goal to present the magnitude of the estimated future infrastructure and operation and maintenance costs for water supply, wastewater treatment and stormwater infrastructure. Our estimates rely on our own assumptions and the estimates of others, thus they are subject to uncertainty. To try to capture some of that uncertainty, we take the estimated costs for the Metro Water District from Table 3 and give them a range of plus or minus 20 percent. Our other estimates of stormwater and the urban area outside of Atlanta already factor in a similar level of uncertainty. For the Metro Water District, the estimated cost for water supply and wastewater treatment infrastructure including operation and maintenance from 2010 to 2030 is \$30.6 billion-\$46.0 billion. Stormwater infrastructure costs and operation and maintenance are estimated to be \$3.2 billion-\$5.5 billion from 2010-2030. Thus, total cost of water related infrastructure and operation and maintenance is \$33.8 billion-\$51.5 billion for the Metro Water District.

**TABLE 8. SUMMARY FOR 2010-2030**

	<b>Low Cost Estimate*</b>	<b>High Cost Estimate*</b>
<b>The Metro Water District</b>		
Wastewater and Water Supply Capital Spending, Operation and Maintenance	\$30.6	\$46.0
Stormwater Capital Spending and Operation and Maintenance	\$3.2	\$5.5
Total Metro Water District	\$33.8	\$51.5
Urban Georgia Outside the Metro Water District	\$10.2	\$14.8
Total State Water Infrastructure Spending: Capital, Operation, and Maintenance	\$44.0	\$65.8

\*In billions of 2008 dollars.

Source: Metropolitan North Georgia Water District (2003b,c), Metropolitan North Georgia Water District (2008c) and author's calculations.

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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These are very large numbers. To put some perspective on the magnitudes, it may be helpful to compare them to the projected cost of the Task Force's recommendation for the 2015 contingency plan. Recall the Task Force recommended the potable reuse water option. Due to the extremely high costs of this project, the Task Force only recommends it out of necessity, as a last resort. The cost of completing such a project by 2015 was estimated to be \$3 billion, if Georgia would start the project in 2011, it would cost roughly \$750 million per year.

However, the annual cost of the Task Force's last resort project is less than half the annual cost of the estimated needed improvements to the Metro Water District water related infrastructure including operations and maintenance. The estimated annual cost to the Metro Water district for necessary water related infrastructure is \$1.7 billion to \$2.6 billion. (That is the total estimated costs \$33.8 billion and \$51.5 billion divided by 20 years.)

For the urban areas in Georgia outside the Metro Water District our estimates for water supply and wastewater treatment infrastructure and operation and maintenance are \$10.2 billion to \$14.8 billion, for the period 2010 to 2030. We use our estimates in Table 7 for the period 2010 to 2020 to arrive at these new estimates. The low estimate is the total low estimate of \$6.1 billion from Table 7 plus an additional 10 years of estimated operation and maintenance of \$4.1 billion. We assume no additional money is spent on treatment or conveyance facilities from 2020 to 2030. For the high cost estimate, we start with the \$8.7 billion figure in Table 7 and add 10 more years of operation and maintenance at \$4.1 billion, as well as the low cost estimates for treatment and conveyance facilities from Table 7 of \$2 billion. Here, we assume some need for additional capital for treatment and conveyance but at the low cost range of our Table 7 estimate.

By our estimates as well as those of the Metro Water District, the state of Georgia will incur \$44.0 billion-\$65.8 billion in water related infrastructure costs from 2010-2030. This is \$2.2 billion-\$3.3 billion annually for the next 20 years. These costs are likely to be borne primarily by local governments and water authorities and will vary in different parts of the state. Some local governments and water authorities will be able to use traditional bond financing to raise money for this

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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necessary infrastructure. Others will have to look to GEFA and perhaps nontraditional infrastructure financing. The role of GEFA and what other types of infrastructure financing might be available will be the topic of future research.

The largest share of the water related infrastructure spending in Georgia will be done in the Metro Water District. Given the *In re Tri-State Water Rights Litigation* decision and ongoing negotiations with Alabama and Florida, the allotment of water the Metro Water District can expect from Lake Lanier is uncertain. However, given the Task Force's recommendation that additional conservation measures be pursued regardless of the allotment, as well as Georgia's weakened bargaining position, it would seem that conservation will play a larger role in future Metro Water District plans. Exploring an enhanced role for conservation and how it might affect future Metro Water District infrastructure needs will also be a topic of future research.

## An Analysis of Water Related Infrastructure Spending in Georgia

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### **Appendix A**

The assumptions for collection and conveyance capital cost for wastewater and water supply are approximately \$3,700 and \$2,000 per additional county resident respectively (Metropolitan North Georgia Water District 2003b,c). Operation and maintenance for water supply is \$70 per year per capita; operation and maintenance for wastewater is \$62 per year per capita (Metropolitan North Georgia Water District (2003b,c). Capital expenditures on treatment facilities and supply facilities are derived from Table 2 as 14.5 percent of the total collection and conveyance costs as well as operation and maintenance costs from wastewater and water supply. Population estimates for 2010 and 2030 are linear extrapolations based on Metro Water District population estimates up to 2035. Our household estimates are based on 2.8 persons per household and 67 percent of the Metro Water District water use is residential (Metropolitan North Georgia Water District (2003c). Estimates for total costs do not match Table 2, this is likely due to our population extrapolations as well as operation and maintenance estimates based on average population for each county in the 20 year period.

## An Analysis of Water Related Infrastructure Spending in Georgia

### Appendix B

Estimated Annual Per Capita Implementation Cost by Program Category

Level of Service	Low	Medium	High
5.A Legal Authority	0.5	1.13	1.75
5.B Watershed Planning	0.15	0.38	0.6
5.C Land Development	0.5	0.88	1.25
5.D Asset Management	3.1	14.55	26
5.E Pollution Prevention	1.3	2.13	2.95
5.F Watershed Conditions Assessment	0.3	0.44	0.58
5.G Education and Public Awareness	0.22	0.29	0.36
5.H Resource-Specific Measures	0.25	0.75	1.25
<b>TOTAL</b>	<b>6.32</b>	<b>20.53</b>	<b>34.74</b>

Basis for costs includes: Metro Water District 2003 Watershed Management Plan, EPA NPDES MS4 implementation cost literature and budget information provided by Metro Water District communities  
Source: Metropolitan North Georgia Water District (2008c).

Estimated Cost of Selected Stormwater Capital and Maintenance Activities

Future Floodplain Conditions Mapping (Per Stream Mile)	\$750	\$3,125	\$5,500
Additional Maintenance Elements			
Inlet Cleaning	\$0.20	\$0.35	\$0.50
Pipe Rehabilitation/ Point Repairs	\$0.50	\$1.75	\$3.00
BMP Cleaning/ Inspections	\$0.25	\$1.13	\$2.00
Sweeping	\$0.50	\$1.25	\$2.00
Ditch Cleaning/ Maintenance	\$0.50	\$0.88	\$1.25
Computerized Maintenance Management System	\$0.40	\$0.50	\$0.60
Capital Improvements & Watershed Improvement*			
Upgrade, Remove and Replace Storm System	\$1.50	\$2.50	\$3.50
Design and Professional Services	\$1.60	\$1.95	\$2.30
Watershed Improvement Plan (Per Acre)	\$4.00	\$9.50	\$15.00
Streambank Stabilization/ Restoration (Per Stream Mile)	\$150	\$325	\$500
Retrofit Wet Pond (Per Pond Acre)	\$35,000	\$92,500	\$150,000
New Wet Pond Construction (Per Pond Acre)	\$35,000	\$55,000	\$75,000

\*Retrofit and restoration costs include engineering, permitting, and construction.

**APPENDIX C. ESTIMATED PER COUNTY COST OF NEW PROPERTY RIGHTS STATUTE IN GEORGIA**

County	Cost Gov. @ \$3,175	Cost Claimant @ \$6,250	Litigation Costs \$52,500 each	Award Claimant 50% @ \$52,700	Gov. Pays Costs 10% @ \$52,500	Claimant Pays		Net Cost	
						Gov. Costs	Claimants	Gov.	Gov.
Bartow	\$382,472	\$752,897	\$1,264,867	\$634,843	\$63,243	\$6,324	\$1,326,002	\$2,339,100	
Cherokee	\$1,504,940	\$2,962,481	\$4,976,969	\$2,497,964	\$248,848	\$24,885	\$5,217,522	\$9,203,837	
Clayton	\$1,507,246	\$2,967,019	\$4,984,592	\$2,501,790	\$249,230	\$24,923	\$5,225,513	\$9,217,934	
Cobb	\$3,703,796	\$7,290,938	\$12,248,775	\$6,147,719	\$612,439	\$61,244	\$12,840,799	\$22,651,485	
Coweta	\$493,681	\$971,813	\$1,632,645	\$819,432	\$81,632	\$8,163	\$1,711,556	\$3,019,227	
DeKalb	\$3,315,005	\$6,525,600	\$10,963,008	\$5,502,386	\$548,150	\$54,815	\$11,492,887	\$20,273,734	
Douglas	\$472,640	\$930,394	\$1,563,062	\$784,508	\$78,153	\$7,815	\$1,638,609	\$2,890,547	
Fayette	\$436,245	\$858,750	\$1,442,700	\$724,098	\$72,135	\$7,214	\$1,512,431	\$2,667,965	
Forsyth	\$614,348	\$1,209,347	\$2,031,703	\$1,019,721	\$101,585	\$10,159	\$2,129,902	\$3,757,199	
Fulton	\$4,267,914	\$8,401,406	\$14,114,363	\$7,084,066	\$705,718	\$70,572	\$14,796,557	\$26,101,489	
Gwinnett	\$4,631,817	\$9,117,750	\$15,317,820	\$7,688,087	\$765,891	\$76,589	\$16,058,181	\$28,327,026	
Hall	\$1,167,927	\$2,299,069	\$3,862,436	\$1,938,575	\$193,122	\$19,312	\$4,049,120	\$7,142,747	
Henry	\$1,410,624	\$2,776,819	\$4,665,056	\$2,341,414	\$233,253	\$23,325	\$4,890,533	\$8,627,020	
Paulding	\$526,890	\$1,037,184	\$1,742,470	\$874,554	\$87,123	\$8,712	\$1,826,689	\$3,222,324	
Rockdale	\$364,865	\$718,238	\$1,206,639	\$605,618	\$60,332	\$6,033	\$1,264,960	\$2,231,420	
Walton	\$362,431	\$713,447	\$1,198,591	\$601,578	\$59,930	\$5,993	\$1,256,523	\$2,216,537	
Totals				\$41,766,352			\$87,237,784	\$153,889,590	

Source: Bluestone (2007) and author's calculations.

## **An Analysis of Water Related Infrastructure Spending in Georgia**

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