

“Growing demands . . . will put pressure on limited water resources. But those pressures need not create water crises if individuals are allowed to respond through market processes.”

— Terry L. Anderson and Pamela Snyder  
*Water Markets* (1997b, 204)

# Averting Water Disputes: A Southeastern Case Study

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## INTRODUCTION

At midnight on August 31, 2003, time ran out on a proposed agreement among the states of Alabama, Florida, and Georgia to allocate water in the Apalachicola-Chattahoochee-Flint (ACF) river basin. The deal had been thirteen years in the making, but it ended in failure. “It’s a true shame that we were as close as we were and couldn’t get an agreement,” said Alabama’s chief negotiator (Shelton 2003b, G1).

It was, indeed, a shame. The collapse of these lengthy negotiations sends the matter to the courts, and the Supreme Court may ultimately decide how the disputed water will be divided.

More broadly, the failure of the state governments to reach agreement reveals that water, long considered plentiful in the southeastern United States, is in danger of becoming a subject of intractable conflict. The failure signals that a water crisis may well emerge in the region unless new approaches to allocating water are adopted.

As the population of the Southeast increases, competing demands for water—for municipal use, for recreation, and for hydropower, to name just a few—are growing. Today the problem surfaces in the form of occasional interstate disputes such as this one, but the failure to resolve them casts an ever-longer shadow over the future of water resources in the region. When demands of competing users outstrip supply, there must be ways to ensure that water goes to the users who value it most and that the waterways of the Southeast are not roiled by unending conflict.

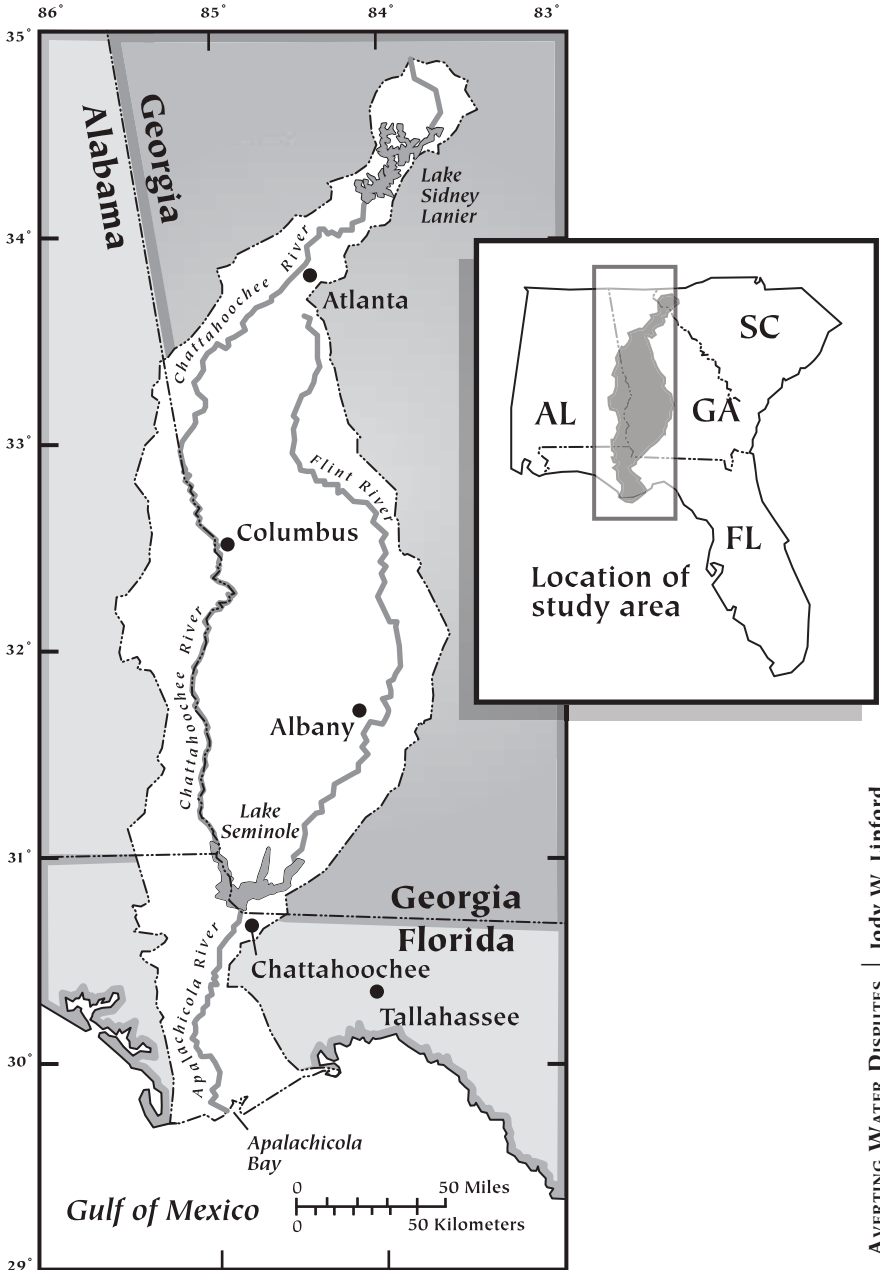
This essay will explain the reasons behind the conflict in the Apalachicola-Chattahoochee-Flint river basin, why attempts at resolving it failed, and what alternatives should be considered. It will explain how to allocate water to its most productive uses, restore peace to the areas around these waterways, and avert other conflicts that are emerging, not only in these states but elsewhere in the South.

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## THE BACKGROUND

As shown on the map in figure 1, the ACF basin drains an area of 19,800 square miles in the states of Georgia, Alabama, and Florida. The basin starts in the headwaters of the Chattahoochee River in northern Georgia, above Atlanta. The Chattahoochee flows through Georgia's Piedmont before turning sharply south, forming the southern half of Georgia's border with Alabama and a notch in Georgia's border with Florida. At the border, it meets the Flint River to form the Apalachicola River, which

**FIGURE 1**  
**APALACHICOLA-CHATTAHOOCHEE-FLINT (ACF) RIVER BASIN**



flows through the Florida panhandle into the Gulf of Mexico (U.S. Geological Survey 2000).

Historically in the ACF basin, as in most of the southeastern United States, water has been abundant and has met the many demands for it. The demands include water for domestic, commercial, industrial, hydroelectric, navigational, and recreational uses.

Under riparian water rights—the system of water rights in the eastern part of the United States—landowners can use water that flows adjacent to their property as long as they do not appreciably diminish the quantity or quality of water available to downstream users. But riparian rights were effectively overridden in 1946, when Congress authorized the U.S. Army Corps of Engineers to construct dams for flood control, navigation, and hydroelectricity along the Chattahoochee River.<sup>1</sup> Later, the Corps added water supply and recreation as purposes of the dams and the reservoirs they created (Carriker 2000, 2; Shelton 2003a). These projects transformed the waters of the basin from private property governed by the riparian doctrine to public property.

Today, the waters of the ACF river basin continue to be owned and managed by the federal government through the Army Corps of Engineers. The Corps' managers meet weekly to consider various water needs, such as hydroelectric production, recreation, navigation, and environmental quality (U.S. Army Corps of Engineers 2001). In addition, all requests to increase water withdrawals must be approved by the Corps (Beaverstock 1998, 993).

With the exception of flood control, each of these purposes requires a minimal lake level or river flow rate. Electricity cannot be produced, nor can barges navigate, without sufficient water. Similarly, fish populations require stable lake levels during spawning season. Sufficient flow also dilutes pollution, helping to ensure water quality (U.S. Army Corps of Engineers 2001). The Corps also commonly provides recreational facilities, such as parking areas, boat ramps, and public restrooms. Response to the recreational amenities of the lakes has been heavy, with millions of

user-days tallied each year (Jeane 2002, 158). The basin also supplies water for public use. All these competing demands limit the amount of withdrawals that can be made.

## CONFLICTS OVER INCREASINGLY SCARCE WATER

For a long time the system of riparian doctrine and public management through the Army Corps of Engineers worked well. In the 1980s and 1990s, however, rapid population growth, particularly in metropolitan Atlanta, combined with recurrent drought led to increased pressure on the ACF river basin's resources.

Atlanta's population grew from 2.2 million in 1980 to 3.0 million in 1990, and then to 4.1 million in 2000. Of 126 metropolitan statistical areas listed by the Census Bureau, only 17 had higher population growth rates from 1980 to 1990, and only eight had higher population growth rates from 1990 to 2000.<sup>2</sup>

Demand for water to satisfy this growing population increased dramatically. Metropolitan Atlanta's water use increased from 289 million gallons per day in 1980 to 459 million gallons per day in 1990, and then to 606 million gallons per day in 2000.<sup>3</sup> Metro Atlanta relies almost exclusively on surface water, over 70 percent of which comes from the Chattahoochee River and Lake Sidney Lanier, the lake formed north of Atlanta by the dam at the headwaters of the Chattahoochee.

Yet the Chattahoochee River and Lake Lanier are ill suited to supplying Atlanta's water needs. The Chattahoochee is the smallest watershed in the country to supply a metropolitan area with the majority of its water (Metro Atlanta Chamber of Commerce and the Regional Business Coalition 2003). The largest share of Atlanta's water use—53.8 percent—is for residential use, while commercial, government, and industrial users take 22.8 percent, 5.6 percent, and 4.2 percent, respectively.<sup>4</sup>

A preliminary study by the Army Corps of Engineers indicates that Atlanta is already approaching, and at times exceeding, water

use levels that were not expected until 2030. Whether these findings are accurate or not—the Georgia Environmental Protection Division says the Chattahoochee River and Lake Lanier are sufficient to supply Atlanta through 2030—there is no doubt that future demands on the Chattahoochee River and Lake Lanier will be heavy and growing (Seabrook 2002).

Drought has worsened this pressure on the river basin's waters. During the 1980s and 1990s, the Southeast experienced recurrent and severe droughts. In the most severe drought, rainfall in Atlanta fell by as much as 25 percent, and annual average streamflows along the Apalachicola River fell to less than half their historical norms.<sup>5</sup>

### THE CRISIS BEGINS

In 1989, recognizing that Atlanta's "finite supply of clean water is looming as a barrier to growth" (Walker 2001, 68), Atlanta and the Army Corps of Engineers proposed to approximately double the water Atlanta drew from Lake Lanier, bringing it to 529 million gallons per day. Without sufficient water, Georgia officials feared the loss of 680,000 jobs and \$127 billion in wages through 2010 (*Economist* 1991, 26).

The proposal by Georgia and the Army Corps alarmed the citizens of Alabama. Increased withdrawals from Lake Lanier would reduce flows along the segment of the Chattahoochee River that forms the southern half of Alabama's border with Georgia and would stunt economic development there. So, in 1990 Alabama sued the Army Corps to keep it from allocating more of the ACF river basin's waters to Atlanta.

The state of Florida quickly joined the lawsuit on the side of Alabama, fearing that reduced water flows would harm the oyster-rich Apalachicola Bay farther downstream. The state of Georgia then joined the lawsuit on the side of the Army Corps of Engineers to defend its withdrawal. The stage was set for thirteen years of

studies, proposals, counterproposals, and extended deadlines.

These actions reflected unique concerns in each state. Alabama officials worried that Atlanta's withdrawals would stifle Alabama's economic development by limiting water needed for domestic, industrial, and commercial use. Water quality would also suffer, because reduced downstream flows would mean less dilution of polluted upstream water. Atlanta not only uses a large amount of water, but also discharges heavily polluted water back into the Chattahoochee (Beaverstock 1998, 996; Walker 2001, 68–69).<sup>6</sup> If dirtier water came from Atlanta, Alabama might have to raise water cleanup standards for industrial and municipal users, which would be costly and would put Alabama at a competitive disadvantage in attracting economic development (Hull 2000, 3).

From Florida's perspective, the problem was oyster beds. Reduced flows, especially at critical times, and heavier pollution could threaten the Apalachicola Bay's oyster industry, which supplies approximately 10 percent of the country's oysters and employs over 1,000 people. The river is also a commercial source of shrimp, blue crab, and finfish, as well as the home of an important sport fishery and the only commercial source of Tupelo honey. It has been recognized as an Outstanding Florida Water (American Rivers 2002, 34; Apalachicola Bay Chamber of Commerce 2003).

Other factors exacerbated the conflict. For example, recreational users want lakes kept full or nearly full; however, the competing objectives of hydropower and flood control require lakes to be drawn down, typically during summer and winter. Similarly, navigation requires minimal flows that reduce the water in lakes when river levels become too low for barge traffic. Finally, ecosystem preservation requires a pattern of flows that mimics nature's seasonal cycle and may conflict with other demands (Carriker 2000, 2; Hull 2000, 3).

Despite years of negotiation, the states never reached agreement on how to allocate the basin's waters. Because these negotiations failed, the matter will now likely be settled by the Supreme Court.

## CONSTITUTIONAL PATHS TO SOLUTION

Once Alabama took the Corps to court in 1989, the states had several constitutional options to choose from to settle the conflict over water allocation. They could go to Congress for a decision; their suits could reach the Supreme Court; or they could negotiate their own agreement or compact. Neither Congress nor the Supreme Court likes to get involved in interstate water disputes. Moreover, suits reaching the Supreme Court are costly, usually require lengthy negotiations, and yield uncertain outcomes.

For these reasons, the states opted for an interstate water compact. Alabama agreed to deactivate its lawsuit during the negotiation period; the Army Corps of Engineers agreed not to allocate additional water from Lake Lanier to Atlanta; and all parties agreed to a comprehensive study of the water resources in the basin (Carriker 2000, 3–4).<sup>7</sup> In early 1997, all three state legislatures ratified legislation authorizing the negotiation of an ACF River Basin Compact to allocate the basin's waters. These acts were subsequently signed by the three state governors. The U.S. Constitution requires congressional approval of interstate compacts, so in November 1997 Congress approved and President Clinton signed federal authorizing legislation. The goal of the compact was to assign property rights to water in such a way as to be fair and avoid future conflicts. This goal proved elusive, however.

### THE FAILURE OF THE COMPACT

The federal legislation set an initial deadline for compact negotiations of December 31, 1998, unless the states agreed unanimously to extend that deadline.<sup>8</sup> This deadline proved much too optimistic, as each state presented proposals reflecting its parochial interests. To begin with, Alabama and Florida wanted consumptive uses of water defined and limited.<sup>9</sup> Georgia resisted this approach in favor of one that focused on reservoir levels. Specifically, Geor-



gia wanted the ACF river basin’s reservoirs to be kept full or nearly full (Moore 1999, 8), so that Georgia would have enough water to supply Atlanta (Carriker 2000, 14). In return, Georgia offered Alabama and Florida minimum flow guarantees. But Alabama and Florida rejected Georgia’s proposal, fearing that the minimum flows might become the norm, in essence reducing the water flowing downstream.

To ensure adequate flows along its border, Alabama argued that the ACF river basin’s water should be allocated to meet the original objectives of dam construction. These included navigation (i.e., barge traffic), flood prevention, and hydroelectric production—but not water supply to municipalities or recreation (Carriker 2000, 2; Moore 1999, 9). Florida agreed with Alabama in opposing minimum flows, but also wanted downstream flows to be adjusted to mimic natural flow cycles. Additional problems plagued the negotiations, from definitional questions (e.g., how to define “severe drought”) to the choice of the computer model for forecasting river flows and lake levels (Moore 1999, 9–10).

With no agreement forthcoming, the states agreed to extend the deadline till January 1, 2000. Yet the passage of another year did not appreciably advance the negotiations. Once again the states set a one-year deadline, establishing a pattern of deadline extensions that continued until July 22, 2003. At that point, progress seemed to have been made. The three governors signed a Memorandum of Understanding that set a blueprint for water allocation in the ACF river basin. The memorandum authorized water supply for Atlanta from Lake Lanier at 705 million gallons per day and left open the possibility of greater future withdrawals. The memo also established minimum flow requirements downstream from Atlanta, the most important of which was a flow of 5000 cubic feet per second on the Apalachicola River at Chattahoochee, Florida. The deadline for final agreement on the memorandum was August 31, 2003 (Alabama, Florida, and Georgia 2003).

Although Florida governor Jeb Bush signed the memorandum,

he and other Florida officials had reservations, which they expressed in an accompanying statement (Struhs 2003). They insisted that minimum flows must not become targets, that Lake Lanier must be managed to deal effectively with drought, and that the governing ACF Commission must have authority to approve any withdrawals from Lake Lanier that exceeded the amount specified in the memorandum.<sup>10</sup>

Ultimately, the states could not reach agreement. Florida feared that minimum flows, which had been less than 5,000 cubic feet per second only twice during the recent droughts (on a mean monthly basis), might become the norm. Thus, Florida officials again raised the issue of Georgia's withdrawals from Lake Lanier. Georgia officials responded by agreeing either to limit Atlanta's withdrawals or to promise minimum flows through the basin, but not both, and accused Florida of trying to micro-manage its waters (Ritchie 2003a, 2003b). As a result, Florida officials refused to accept the Memorandum of Understanding, and the deal collapsed. The states have now reactivated their original lawsuits (Shelton 2003a, C3; 2003b, G1; Ritchie 2003b, A1).<sup>11</sup>

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## THE ALLOCATION OF WATER

Economists recognize the scarcity of valuable resources. Without prices on these resources, there is not enough to satisfy all who want to use them. In most settings, however, market prices allocate resources, allowing them to move to those users who value them the most. This market process allocates resources to their most productive uses and maximizes society's wealth. In the case of the ACF river basin water, however, market prices do not currently allocate water; it is allocated politically.

Economists also recognize that resources have multiple uses. Water, for example, may be used to generate electricity, aid oyster production, provide wildlife habitat, produce industrial products,

provide channel depth for barges, provide recreational opportunities for boaters, skiers, and fishers, or supply households with water for drinking, watering lawns, or filling swimming pools. In the ACF basin, some water is used in each of these ways.

Whether allocation occurs through market prices or other methods, it is rarely all-or-nothing. In the Southeast (and the United States generally), there is ample water to supply basic human needs, such as drinking water. Where conflicts occur, as in the ACF basin, it is over shifting some water, not all water, from one use to another. Simply put, the ACF basin issue is whether more water should be allocated to Atlanta, presenting Alabama and Florida with the prospect of less water but not complete deprivation.

Although compacts have some advantages over congressional or judicial apportionment, they are poorly suited to allocate water in ways that maximize water's productive value to society. Compacts are highly political and confront intractable information problems, and such was the case with the negotiations over the ACF basin's waters.

## INTEREST GROUPS

Groups with a vested interest in the outcome of the compact influenced the ACF river basin negotiations. Each tried to get more water allocated in its favor, irrespective of water's most productive uses. The influence of these groups introduced conflict, making a workable agreement difficult to achieve. Industrial, environmental, municipal, and political interests all made their voices heard (Moore 1999, 8). The *Atlanta Journal-Constitution* identified political and business leaders of metropolitan Atlanta, environmentalists, and Florida's shellfish and fishing industries as uncompromising interest groups who refused to yield to the demands of other users (Shelton 2003b, G1).

The Apalachicola Bay's oyster industry serves as an example of a small, well-organized interest group with strong influence, since

its employment of approximately 1000 people is minimal in a state with total employment of approximately 7.2 million.<sup>12</sup> It should be noted, however, that the industry had support throughout the state of Florida from citizens who wanted the environmental amenities of their state's river to be preserved.

After the agreement failed, some interests, such as the Atlanta Regional Commission and homeowners and businesses on Lakes Lanier and West Point, seemed just as happy. They feared Georgia had compromised too much already.

### INFORMATION PROBLEMS

Even if negotiators could be insulated from interest group influence, they would still face important informational questions. If their goal is to allocate the water to its most productive uses, negotiators must first know how much total water can be allocated and how that will vary over years of normal rainfall and drought. Perhaps most important, they need to determine whether society will benefit more from allocating water to Atlanta's developers, say, or to Florida's oyster producers. And, if they can decide objectively to allocate more water to Florida's oyster producers, they would still have to decide whether the extra water should come from Lake Lanier (thereby maintaining levels at downstream reservoirs) or from downstream reservoirs (thereby maintaining levels at Lake Lanier).

By making these decisions, policy makers are implicitly choosing who will benefit and who will be harmed. A decision to allocate more water to Atlanta lessens development in eastern Alabama and reduces Florida's seafood production. A decision to allocate more water to Alabama and Florida benefits the economies of these states, but curbs Atlanta's economic development. Similarly, a decision to supply downstream users from Lake Lanier diminishes recreational opportunities for users of the lake, while maintaining those opportunities for users of downstream reser-

voirs; the opposite decision would benefit Lake Lanier's recreational users but harm those who use downstream reservoirs. And even if policy makers could determine water's most productive uses, their decisions would soon be rendered obsolete by changes in the total supply of water, changes in the total demand for water, and marginal changes in allocation necessary to maximize the total productive value of the basin's water resources.

Negotiators did try to obtain answers to some of the technical questions through the use of computer software that forecast future river flows and reservoir levels based on consideration of "historic rainfall patterns over the last fifty-five years" and "anticipated water uses within the basin in a future year, typically 2030 or 2050" (Moore 1999, 8). But historical rainfall patterns are not guaranteed to be repeated. Nor are anticipated water uses easily forecast. Atlanta's rapid population growth and commensurate water use have been dramatically under-predicted by the experts.<sup>13</sup> To compound matters further, different software programs give different estimates and, perhaps not surprisingly, the states have used different modeling programs (Moore 1999, 10).

## PRACTICAL PROBLEMS

Negotiators confronted two other factors that made agreement less likely: (1) The ACF river basin's waters were already fully allocated, and (2) the drought was expected to end soon. That the water wealth of the ACF river basin is already fully allocated made bargaining more contentious, because changes will force redistribution of existing allocations. In contrast, for example, the country's first interstate water compact, the Colorado River Compact of 1922, was negotiated in the arid West, with anticipation of more water from the Boulder Canyon Project Act, which authorized the Hoover Dam and created Lake Mead. Moreover, negotiators knew the 1998-2002 drought was unprecedented and would likely come to an end, reducing pressures on the ACF

river basin's waters. These expectations were borne out, as abundant rain fell during the latter half of 2002 and during 2003.<sup>14</sup>

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## PROPOSALS FOR MARKETING WATER

With compact negotiations now in disarray, policy makers must look to other alternatives. An obvious proposal is for Atlanta (and other municipalities in the basin) to charge a price for its water that at least approximates its market value. Ample evidence shows that higher water prices reduce consumption (Anderson and Snyder 1997a, 12–13). At present, water is underpriced in Atlanta, leading to overuse. Even in the most recent drought, the city of Atlanta raised its price to residential users by only 3 percent. For the average residential user, the monthly water bill rose from \$16.55 to \$17.05. The city plans additional rate hikes through 2004, but these will raise average residential bills by a mere \$1.00 per month (Atlanta Bureau of Water 2003). During the drought, rather than raising the price of water further, officials imposed restrictions on outdoor water use that continue to be in effect (Atlanta Regional Commission 2003a; Judd 2000).

Raising water prices to market levels is apparently not politically feasible. This means that the states of Alabama, Florida, and Georgia and the federal government should consider basin-wide proposals to create water markets. Experience with markets in water has shown that they can overcome some of the most difficult challenges of water allocation. They can ensure that water is allocated to its most productive uses and can prevent conflicts among users.

To some, marketing water is still a strange idea. Long accustomed to the notion that water is a commonly owned resource, many readers may doubt that it is feasible to “trade” water and thereby satisfy various interests more readily than through political negotiations. Yet there is a strong precedent for marketing of

water. Much of the American West is arid, receiving less than 17 inches of precipitation a year. With water always precious, the West evolved a system of private property rights to water, and with it, water markets. This system, known as the prior appropriation doctrine, resulted from the need to divert water for mining and agriculture. In simplest terms, it allowed a person to divert water from a river or stream on the basis of seniority (or “first in time, first in right”), with the right remaining as long as the individual continued to use the water (“use it or lose it”). Water users could transfer their rights to others. The private provision of water flourished (Anderson and Snyder 1997b, 31–45), and continues to do so, although laws that guide the transfers of water are somewhat antiquated, and restrictions on transfers that made sense in the past do not necessarily encourage efficient use today.

In spite of these restrictions, water trades occur among agricultural users, between agricultural users and cities, and between agricultural users and environmentalists. Even interbasin and interstate trades are common (Anderson and Snyder 1997a, 14–21). In Texas, where both riparian and prior appropriation doctrines are recognized, a system of marketable permits similar to the one described below allocates water along the Rio Grande River (Yoskowitz 2001).

In a fully functioning water market, users pay a market price for water consumed, and that price serves as a rationing mechanism. Those who can put the water to the most productive use, and demonstrate this by willingness to pay, will purchase the water, be they residential developers or oyster producers. Market prices motivate those with relatively less productive opportunities to sell the water to more productive users. Through markets, groups can work out slight or marginal changes that maximize the total value from all uses.

Markets also yield peace among transacting parties. In markets, only the parties considering buying or selling a resource take part in the negotiations. Outside influences from politicians, bu-

reaucrats, or interest groups do not guide the negotiations, as they do in the political process. The terms of exchange, such as the price, must be voluntarily agreed upon for exchange to occur. Any would-be buyer or seller who does not like the price does not have to buy or sell.

In contrast, in the political sphere, resource users often do not pay a price for a resource they consume, or they pay less than the resource's market value. This tends to encourage them to always want more and leads to conflicts among users and a state of perpetual unhappiness for all.

As economists often point out, the foundation for markets is private property rights that are defined—that is, rights with a clearly specified ownership claim; enforced—that is, rights with a claim that is secure; and transferable—that is, rights that may be sold to others. Clearly defined, enforced, and transferable property rights are necessary for exchange. Buyers will not purchase resources if the rights to those resources are uncertain or insecure, but when rights to property are certain, secure, and transferable, markets flourish. Market-based allocation of the ACF river basin's waters would encourage allocation of the basin's waters to their most productive uses and foster peace among users.

## THE ARMY CORPS' ROLE

To understand how markets might work, it is appropriate to begin with the Army Corps of Engineers, which is the effective owner of the water in the ACF basin. At present, the Corps is almost entirely dependent upon congressional appropriations. In the Mobile District in which the ACF river basin is located, the Corps receives some fees for its services, but they represent a small part of the Corps' budget. The fees it receives are either insufficient to cover the costs of its services (as in recreation fees), or the Corps does not retain the revenues (as in the case of revenues from hydropower), or it simply does not charge for the services it pro-



vides (as in the case of navigational services, although commercial vessels do pay a fuel tax that is used to fund inland waterway projects).

Since the Corps is supported by taxpayer dollars and cannot receive financial benefit from the services it provides, it has no incentive to determine which competing uses are most productive and thus to adopt market exchange as the way to allocate water in the basin. In an ideal world, the Corps' financing and function would be changed to give it an incentive to allocate scarce water resources to their most productive uses, thereby raising the total wealth generated from the basin's waters. This would happen if the Corps were to retain property rights and management authority over the basin's waters, but taxpayer support of the Corps and its projects were reduced. In exchange, the Corps would be given the authority to charge whatever fees it deemed appropriate for the services it provided and to retain the revenues. For example, the Corps could implement or change fees it charges for hydropower, dredging, water supply, and recreational services. If drought or increased demand raised the relative scarcity of water, the Corps would have the authority to raise fees. Some taxpayer support is justified since the Corps also provides flood control that benefits all users.

Although the Corps' power in Congress is extremely powerful and therefore such a change in the financing of the Corps is unlikely, there is some precedent for this kind of institutional reform of a public agency. In 1996, the Fee Demonstration Program allowed the National Park Service, the Forest Service, the Bureau of Land Management, and the Fish and Wildlife Service to each choose 100 sites that could raise or implement new fees and retain 80 percent of the revenues. Although the Fee Demonstration Program does not intend self-sufficiency for the participating agencies or individual sites, the results from changed incentives are evident, as these agencies have improved services to visitors of public lands by allocating more funds to badly needed repair and maintenance of some of the country's most-valued natural and recreational re-

sources (Fretwell 1999). Like the Fee Demonstration program, reform of the Army Corps of Engineers could begin on a short-term, experimental basis.

With a mandate to balance its budget and the authority to set fees and retain revenues, the Corps would have an incentive to allocate water resources to their most productive uses. If Atlanta developers wanted more water, they would have to pay a price that reflected the value of the water to other users. If it did not, those other users would outbid it. The Corps would also have to take into account the costs of its services. If barge traffic was insufficient to generate revenues to cover the costs of dredging, the Corps would cease to dredge the basin. Through this system, those with the most productive opportunities for the water would be the ones to obtain it. Such allocation would also maximize the Corps' net revenues. Unfortunately, this outcome is not very likely to occur in a political setting.

#### A SYSTEM OF MARKETABLE PERMITS

Under current political arrangements, marketable permits seem to be the most promising approach to creating a water market. Marketable permits depend on the assignment of property rights to water. To implement them in the ACF river basin, the Army Corps of Engineers could first establish a daily "water budget," consisting of the total net withdrawals allowed from the basin, based on average daily withdrawals from some past period of consumption. After this global budget is established, the Army Corps of Engineers could grant water allocations to each user based upon average daily use, again from some period of past consumption. Even though hydropower producers, barges, and oyster producers do not strictly divert water, the water they use is "diverted" from the basin into the Gulf of Mexico and therefore should be measured for the allocation. By making the allocations daily, the Corps would allow for seasonal variations in demand and flood control. Permit

allocations would be divisible and transferable. And, of course, under no condition could water be allocated in a way that violates federal water use laws.

When the supply of rainfall was abundant, so that water in the basin exceeded the global daily budget, all users could be satisfied without the need to transfer water among users. However, in the case of drought, the Army Corps of Engineers could cut daily permit allowances by an equal percentage for all users. The Corps could then serve as a water broker, facilitating transactions among users, by matching buyers and sellers and helping to negotiate terms of exchange, while charging a fee to cover administrative costs. Similarly, if the demand for water rises to the point that it exceeds the global daily budget, users wanting more water would have to purchase that water from other users.

To see how this might work, consider a simplified example with two users, a lake, and a river running downstream from the lake. Suppose the two users are Atlanta developers and Florida oyster producers, the lake named Lake Lanier, and the river the Chattahoochee. Suppose that for a given day, the water budget for this river basin is 1,000 gallons, allocated between 800 gallons for Atlanta developers and 200 gallons for Florida oyster producers. (Actual quantities would, of course, be in the millions of gallons per day.)

If rainfall allows greater net withdrawals, say to 1,100 gallons, each user's allotment can rise by 10 percent. A drought, however, might reduce net withdrawals to 900 gallons, forcing cuts in permitted allotments to 720 gallons for Atlanta developers and 180 gallons for Florida oyster producers. This is where trading comes in. If Atlanta's developers want to restore their allocation, they must offer to purchase an additional 80 gallons from Florida's oyster producers. If the contracting parties agree, the Army Corps will release less water from Lake Lanier, increasing the amount available to Atlanta's developers and reducing the downstream flow for Florida's oyster producers.

If, in contrast, Florida's oyster producers want to retain a flow of 200 gallons, they will offer to purchase an additional 20 gallons from Atlanta developers. If the parties agree, this time the Army Corps of Engineers will release more water from Lake Lanier, reducing the amount available for Atlanta's developers but increasing the flow for Florida's oyster producers.

One can envision associations of users with similar wants, such as an upstream association of developers and recreational users, and a downstream association of hydroelectric utilities, barges, environmentalists, and oyster producers. At times, association members would benefit by combining funds and sharing costs.

Purchasing water allotments to retire (that is, not use) them should also be allowed. For example, if electric utilities want to increase downstream flows to generate electricity at the same time that recreational users want lake levels held high, as on a summer holiday weekend, the recreational users could purchase water rights from the electric utilities, if the utilities agreed, and retire those rights. Instead of producing revenues through hydro-power, the electric utilities would receive payments from recreational users. Similarly, environmentalists might want to purchase and use or retire rights during seasons when fish spawn.<sup>15</sup>

In each of the exchanges described, the amount of water traded would be a small portion, not all of the total allowances. For example, recreational users would likely purchase some, but not all, of the electric utilities' water. Lake levels would fall enough to generate some electricity, but not as much as they would fall if recreational users didn't purchase some of the water rights.<sup>16</sup>

To be effective, these marketable permits must have the key characteristics of property rights: They must be clearly defined, so that each user knows its allocation for each day; enforced, with the Army Corps of Engineers serving as enforcer of the permit allowances through its monitoring of lakes and dams; and transferable, with transfer facilitated by the Army Corps of Engi-

neers serving as broker. With defined, enforced, and transferable property rights, a water market could develop that would ensure an allocation of water to its most productive uses and peace among contracting parties.

As an alternative to water transfers among users at mutually agreed upon prices, the Corps could advance market allocation by establishing a water bank. The Corps could serve as an underwriter that buys and sells water at specified prices, with the spread between these prices used to cover the costs of administering the bank. Such banks have been used in times of drought. For example, water banks were used successfully in 1977 and 1991 in California to cope with drought. In 1991 California offered to purchase water at a price of \$125 per acre-foot and to sell water at a price of \$175 per acre-foot. The state purchased and sold 400,000 acre-feet of water, mostly to municipal and agricultural users (Anderson and Snyder 1997b, 11–12, 102–103).

In the case of the ACF river basin, the Army Corps of Engineers could assign users daily property rights to flows of water, based on historic use patterns, and then serve as a water banker, standing ready to buy and sell water at specified prices. Depositors could leave water in the basin, and buyers could withdraw it. With price playing an allocative role and with voluntary transactions, the basin's waters would be allocated more efficiently and relations among the ACF river basin's users would become more harmonious.

## IMPLICATIONS FOR THE SOUTHEAST

Making these kinds of changes in the ACF river basin is critical because water conflicts are brewing throughout the Southeast. Along Georgia's border with South Carolina, a request by Habersham County, Georgia, to withdraw 12.5 million gallons per day from the Savannah River Basin provoked the South Carolina state legislature to introduce resolutions calling on Congress to stop the Army Corps of Engineers from granting the request, which

would have transferred water from the Savannah river basin to the ACF basin.<sup>17</sup> In addition, Georgia is involved in a dispute with Alabama over water in the Alabama-Coosa-Tallapoosa river basin. And North Carolina and South Carolina have disputed the flow of water in the Yadkin-Great Pee Dee river basin (Henderson 2002; Libaw 2000; Pompe and Franck 2003). By establishing water markets in the ACF river basin, the states of Alabama, Florida, and Georgia could serve as an example to other southeastern states to help them avoid the conflicts that have for so long plagued the attempts to allocate that basin's waters.

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### WHAT CHANCE FOR CHANGE?

Market reforms offer great potential, but when government is in control, change typically comes about only with crisis. Higher rainfall since the summer of 2002 has diminished the sense of crisis. Does this mean that all hope is lost for market allocation of water in the ACF river basin or elsewhere in the Southeast? Not at all.

By failing to achieve compact resolution, the states of Alabama, Florida, and Georgia, have embarked down the risky path of judicial apportionment. The risk is that the Supreme Court could allocate the ACF river basin's waters in a way that is unsatisfactory to each or all of the states (Erhardt 1992, 226). Because these allocations are not transferable, states with an unsatisfactory allocation would have no way, short of further litigation, to change the allocation. As the states contemplate this possibility, they may find it prudent to drop their lawsuits and pursue a means of allocating water that relies on markets, such as one of the proposals offered in this essay.

Once demand permanently outstrips supply under current arrangements, water in the Southeast will be rationed. The question will be how. Will water be rationed by markets, which promote productive use and harmony among users? Or will it be rationed

by political processes that are likely to result in misallocation and conflict? As economic development continues, perhaps plagued by drought, the citizens of the Southeast may choose the efficiency and harmony of markets over the misallocation and contention of politics.

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## NOTES

1. The Army Corps of Engineers has long played a role in the ACF river basin. To facilitate commercial traffic, the Corps began dredging the Chattahoochee River in the 1880s. At present, five Army Corps dams dot the ACF river basin: the Buford dam, which forms Lake Sidney Lanier; the West Point dam, which forms Lake West Point; the Walter F. George dam, which forms Lake Walter F. George; the George W. Andrews dam; and the Jim Woodruff dam, which forms Lake Seminole. Authorization and construction of these dams began in the 1940s, 1950s, and 1960s, and by the 1970s they were all operational (Jeane 2002, 151, 155).

2. See table 30 of U.S. Census Bureau (2002, 32–34).

3. Data supplied by Julia Fanning, U.S. Geological Survey, Atlanta, e-mail correspondence, November 7, 2003.

4. See Atlanta Regional Commission (2003b).

5. For data on streamflow of the Apalachicola River at Chattahoochee, FL, see [waterdata.usgs.gov/fl/nwis/annual/calendar\\_year/?site\\_no=02358000](http://waterdata.usgs.gov/fl/nwis/annual/calendar_year/?site_no=02358000).

6. In response to federal consent decrees to stop spills of untreated wastewater into the Chattahoochee and to comply with the Clean Water Act, Atlanta is currently trying to raise over \$3 billion to renovate its antiquated sewage treatment system.

7. Until the compact was completed, the states agreed to “freeze” water at current use levels. Should increased withdrawals be needed, the states agreed to notify other states in advance (Erhardt 1992, 202). For further details, see Public Law 105-104, Article VII (c).

8. Public Law 105-104, Article VIII (3).

9. Consumptive use, also known as water consumed or water depleted, may be defined as the “part of water withdrawn that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the immediate water environment.” The definition also includes “any water withdrawn in the basin and transferred out of the basin for use” (Marella, Fanning, and Mooty 1993, v).

10. Sixty-four percent of the ACF river basin’s reservoir capacity is held in Lake Lanier (Ritchie 2003c, A1).

11. Complicating the legal proceedings is a deal struck by Georgia and the Army Corps of Engineers in January 2003 in which metropolitan Atlanta governments agreed to pay the Corps \$2.5 million per year towards the operation of Lake Lanier’s Buford Dam in exchange for greater withdrawals from the lake. With this deal, metropolitan Atlanta sought not only to obtain additional water, but also to mollify hydropower customers who pay for the dam and who had filed suit against the Corps in 2000 because the Corps had already allocated water from hydropower to supply metropolitan Atlanta. Georgia and the Corps negotiated this deal without informing Alabama or Florida, and set it aside only when Alabama and Florida found out about it and threatened to withdraw from the compact negotiations. This deal, like the initial lawsuits between the states and the Corps, has been reactivated and will have to be settled by the courts (Shelton 2003a; Seabrook 2003).

12. The employment figure is taken from table 602 of U.S. Census Bureau (2002, 393).

13. The *State and Metropolitan Area Data Book, 1997-98* predicted metropolitan Atlanta’s 2000 population to be 3.682 million (U.S. Census Bureau 1998). The actual figure was 4.112 million, an error of 430,000 for a prediction published only two years in advance.

14. From July 2002 to August 2003, rainfall exceeded normal levels in Atlanta, Columbus, and Albany, GA by 9.64 inches, 12.21 inches, and 6.57 inches, respectively. Data supplied by Pam Knox,



assistant state climatologist, Georgia State Climatology Office, University of Georgia, Athens, e-mail correspondence, October 15, 2003.

15. Retiring rights requires some ranking among users. If hydropower users have the higher ranking, recreational users would have to purchase rights from them to keep lake levels up. On the other hand, if recreational users had the higher ranking, hydropower users would have to purchase rights from them to drop lake levels. Coase (1960) argues that clearly defined property rights and sufficiently low transactions costs will lead to resources being allocated to their most productive uses.

16. With less water for hydroelectric production, utilities might have to raise prices to their customers.

17. Before this conflict could escalate, Habersham County withdrew its permit request.

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## REFERENCES

- Alabama, Florida, and Georgia. 2003. Memorandum of Understanding Regarding Initial Allocation Formula for the ACF River Basin (July 22). Online: [www.dep.state.fl.us/secretary/comm/2003/july/0722\\_acf.htm](http://www.dep.state.fl.us/secretary/comm/2003/july/0722_acf.htm) (cited Sept. 29, 2003).
- American Rivers. 2002. America's Most Endangered Rivers of 2002. Online: [www.amrivers.org/mostendangered/2002report.htm](http://www.amrivers.org/mostendangered/2002report.htm) (cited December 10, 2003).
- Anderson, Terry L., and Pamela S. Snyder. 1997a. Priming the Invisible Pump. *PERC Policy Series*, PS-9. Bozeman, MT: PERC.
- . 1997b. *Water Markets: Priming the Invisible Pump*. Washington, DC: Cato Institute.
- Apalachicola Bay Chamber of Commerce. 2003. Apalachicola. Online: [www.apalachicolabay.org](http://www.apalachicolabay.org) (cited Sept. 25, 2003).
- Atlanta Bureau of Water. 2003. Rates, Fees & Meter Price. Online: [www.atlantaga.gov/citydir/water/index.htm](http://www.atlantaga.gov/citydir/water/index.htm) (cited Oct. 28, 2003).

- Atlanta Regional Commission. 2003a. Current Water Restrictions (May 9). Online: [atlreg.com/water/waterrestrictions.html](http://atlreg.com/water/waterrestrictions.html) (cited November 6, 2003).
- . 2003b. Regional Water Supply Plan. Online: [atlreg.com/water/supplyplan.html](http://atlreg.com/water/supplyplan.html) (cited October 28, 2003).
- Beaverstock, Jeffrey Uhlman. 1998. Learning to Get Along: Alabama, Georgia, Florida and the Chattahoochee River Compact. *Alabama Law Review* 49(Spring): 993–1007.
- Carriker, Roy R. 2000. Water Wars: Water Allocation Law and the Apalachicola-Chattahoochee-Flint River Basin. University of Florida, Cooperative Extension Service, Institute of Food and Agricultural Services. Online: [edis.ifas.ufl.edu/BODY\\_FE208](http://edis.ifas.ufl.edu/BODY_FE208) (cited Sept. 24, 2003).
- Coase, Ronald. 1960. The Problem of Social Cost. *Journal of Law and Economics* 3(October): 1–44.
- Economist*. 1991. River Rivalry. March 30.
- Erhardt, Carl. 1992. The Battle over “The Hooch”: The Federal-Interstate Water Compact and the Resolution of Rights in the Chattahoochee River. *Stanford Environmental Law Journal* 11: 200–228.
- Fretwell, Holly Lippke. 1999. Paying to Play: The Fee Demonstration Program. *PERC Policy Series*, PS-17. Bozeman, MT: PERC.
- Henderson, Bruce. 2002. Who Gets the Water? *Charlotte Observer*, Dec. 29.
- Hull, Jonathan Watts. 2000. The War over Water. *Regional Resource*. Atlanta: Council of State Governments.
- Jeanes, D. Gregory. 2002. *A History of the Mobile District Corps of Engineers, 1815–1985*. Online: [www.sam.usace.army.mil/MobileDistrictHistory](http://www.sam.usace.army.mil/MobileDistrictHistory) (cited December 10, 2003).
- Judd, Alan. 2000. State Slaps Water Limits on 15 Metro Counties: Outdoor Water Use Banned from 10 a.m. to 10 p.m. *Atlanta Journal-Constitution*, June 2.
- Libaw, Oliver Yates. 2000. Water Wars: Drought-Ridden Southeast Battles over Use of Rivers (August 14). ABC News. Online: more.

abcnews.go.com/sections/us/dailynews/water000811.html (cited Sept. 16, 2003).

Marella, Richard L, Julia L. Fanning, and Will S. Mooty. 1993. Estimated Use of Water in the Apalachicola-Chattahoochee-Flint River Basin during 1990 with State Summaries from 1970 to 1990. *Water-Resources Investigation Report*, 93-4084. Tallahassee, FL: U.S. Geological Survey.

Metro Atlanta Chamber of Commerce and the Regional Business Coalition. 2003. A Primer on Water Resources in the Metro Atlanta Region. Online: [www.cleanwaterinitiative.com/background/primer.htm](http://www.cleanwaterinitiative.com/background/primer.htm) (cited October 28, 2003).

Moore, C. Grady. 1999. Water Wars: Interstate Water Allocation in the Southeast. *Natural Resources and Environment* 14(Summer): 5–10, 66–67.

Pompe, Jeffrey J., and David P. Franck. 2003. The Economic Impact of Water Transfer: Options for Policy Reform. Working paper, Department of Economics, Francis Marion University, Florence, SC.

Ritchie, Bruce. 2003a. Florida Willing to Take Battle to Court. *Tallahassee Democrat*, August 27, B3.

———. 2003b. High Court May Hear Water Fight. *Tallahassee Democrat*, September 2, A1.

———. 2003c. River Pact Moves Closer. *Tallahassee Democrat*, July 23, A1.

Seabrook, Charles. 2002. Atlanta Guzzling Water; Metro Thirst Exceeds Projections. *Atlanta Journal-Constitution*, May 15.

———. 2003. Water Costs Likely to Rise. *Atlanta Journal-Constitution*, Sept. 8, F1.

Shelton, Stacy. 2003a. Water Deal May Buy Atlanta Some Time. *Atlanta Journal-Constitution*, September 12, C3.

———. 2003b. Water Talks a Washout—States Point Fingers. *Atlanta Journal-Constitution*, September 6, G1.

Struhs, David B. 2003. Statement of Intent to Accompany the Memorandum of Understanding Regarding Initial Allocation Formula

- for the ACF River Basin, July 22. Online: [www.dep.state.fl.us/secretary/comm/2003/july/0722\\_acf.htm](http://www.dep.state.fl.us/secretary/comm/2003/july/0722_acf.htm) (cited Sept. 29, 2003).
- U.S. Army Corps of Engineers, Mobile District. 2001. How the River Systems Are Managed (Dec. 2, 2001). Online: [water.sam.usace.army.mil/narrativ.htm](http://water.sam.usace.army.mil/narrativ.htm) (cited Sept. 30, 2003).
- U.S. Census Bureau. 1998. *State and Metropolitan Area Data Book, 1997-98*, 5th ed. Washington, DC.
- . 2002. *Statistical Abstract of the United States: 2002*. Washington, DC: Government Printing Office.
- U.S. Geological Survey. 2000. Apalachicola-Chattahoochee-Flint River Basin NAWQA Study: Description of the ACF River Basin Study Area, 2000 (last modified August 23). Online: [ga.water.usgs.gov/nawqa/main.description.html](http://ga.water.usgs.gov/nawqa/main.description.html) (cited Sept. 24, 2003).
- Walker, Barrett P. 2001. Using Geographic Information System Mapping and Education for Watershed Protection through Better-Defined Property Rights. In *The Technology of Property Rights*, ed. Terry L. Anderson and Peter J. Hill. Lanham, MD: Rowman & Littlefield, 57–78.
- Yoskowitz, David W. 2001. Markets, Mechanism, Institutions, and the Future of Water. *Environmental Law Reporter* 31, February.