FLORIDA STATE UNIVERSITY

WATER RESOURCES IN FLORIDA:

An Analysis of Options

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BY

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August 1, 2003

Mr. David Struhs
Secretary, Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, Florida 32399

Dear Secretary Struhs:

I have the honor to submit to you *Water Resources in Florida: An Analysis of Options*. The report is the product of extensive research and analysis over the summer months of 2003. Water is a vital natural resource that must be preserved if Florida is to grow and develop. Over the last 30 years dramatic population increases and unchecked growth have placed a strain on the state’s water supply. Also, projected population increases and increased environmental pressures will cause even greater damage.

My recommendation is that Florida should concentrate on integrated resource planning. This policy alternative was recommended based on the use of three evaluative criteria: public support/political acceptability, administrative feasibility, and implementation cost. After examining the options, it was found that integrated resource planning--utilizing aspects of water conservation, growth management, and alternative resource supply--provided a balanced approach for ensuring the future of Florida’s water.

This recommendation has the potential to improve the overall water resource plan. Florida depends on its aquifers to provide water to the more than 16 million residents and a water resources plan will help state officials cope with the challenges of the future.

Respectfully,

Shemika R. Spencer
EXECUTIVE SUMMARY

Water has always been vital to the well being of Florida’s economy and its citizenry. Since the 1970s state policy and location of consumption have changed dramatically. The Water Resources Act of 1972 altered the nature of water rights in Florida by declaring it a state resource and placing it under government control; five water management districts were created to regulate and allocate consumptive use of local water resources.

Over the last 50 years the state’s population has increased from 2.7 million to almost 17 million. Shifts in location of water consumption are directly related to the concentration of growth in the southeastern, central, and southern regions of Florida. Today, efforts are underway to sustain available water supplies to ensure future needs are met.

Information for this report was collected using three methods. First, popular media, surveys and academic literature were analyzed to provide background information and insight into water resource planning and management and local water concerns. Second, applicable statutes and administrative chapters were reviewed to provide knowledge of current state regulations and guidelines governing the Department of Environmental Protection (DEP) and the five water management districts. Third, staff from the Florida League of Cities, Inc., the Legislature, DEP, and water management districts, as well as environmental lobbyists and industry representatives, were contacted to provide insight into current water supply problems and credible alternatives.
This report presents three policy options for water resources: water conservation, growth management, and alternative resource supply. Each option is evaluated against three criteria: public support/political acceptability, administrative feasibility, and implementation cost.

Based on assessment of the alternatives using the three evaluative criteria, a fourth option called integrated resource planning is recommended. Integrated resource planning would be the most viable policy to ensure the future availability of water. This alternative utilizes components of each of the three proposed policy options to guarantee a comprehensive, balanced system of water consumption and use. While each of the proposed policy options is a good alternative none are able to adequately address future water supply needs. Integrated resource planning would assist officials in sustaining adequate water supplies.
I. PROBLEM STATEMENT

The Water Resources Act of 1972 established the five Water Management Districts, which in conjunction with the Department of Environmental Protection (DEP), are authorized to regulate water resources within the state. This vital legislation outlines the state’s policy to:

Protect such water resources and to meet the current and future needs of those areas with abundant water...[and] directs the department and the water management districts to encourage the use of water from sources nearest the area of use or application whenever practical (Florida Statutes Chapter 373.016(4)(a), 2002).

The ability of DEP and the water management districts to successfully enforce these policies has been hindered by rapid growth, lack of communication between local jurisdictions, low rainfall levels over the past five years, and past, present, and future land development plans.

During the last half-century Florida’s human population grew from 2.7 million to approximately 17 million. Throughout state history canals, drains and ditches have been heavily utilized to “dry” large tracks of land to make way for homes, agriculture, and businesses. This has placed the burden of providing nearly all the state’s water needs on the five main aquifers scattered around the state. As the state’s population rapidly increased some areas, such as Tampa Bay, experienced serious water supply issues. Indeed, during the late 1970s, 1980s, and early 1990s water disputes in Tampa Bay erupted from “squabbles” among area municipalities into a full on “water war” (Kuhl, 2001). The onset of these “water wars” prompted lawmakers to attend to the development of the state’s water resources, which had never been adequately addressed,
in order to make certain that growth management and environmental interests would be balanced to meet future needs.

Today, the effects of decades of environmental disregard, in terms of unchecked land development and community growth, have placed a heavy toll on the state’s available water supply. Current growth calculations estimate that the state’s population grows by about 4,500 persons each week (Salamone, 2002). It is estimated that by 2020 the state’s population will have increased from 15.8 million in 2000 to more than 21.8 million (FDEP, May 2002). As the population increases, water use is expected to increase by almost 30 percent from 7.5 billion gallons a day in 2000 to approximately 9.1 billion gallons a day in 2020 (FDEP, April 2002).

The purpose of this report is to examine alternatives to ensure that Florida’s local governments sustain adequate water supplies to meet future demands.
II. BACKGROUND & LITERATURE REVIEW

Background

Three key elements will be examined to understand the importance of Florida’s water resources: (1) hydrology, (2) the history of water management, and (3) future population and water supply estimates. Each of these factors plays an important role in shaping growth management policy today.

First, Florida is surrounded by water on three of its four sides and is situated atop a bed of limestone. As rainwater makes its way through the limestone, it dissolves channels and caves to form underground drainage systems that supplies water to the aquifers (Purdum, 2002). There are five main aquifer systems and the largest is the Floridan Aquifer, which underlies almost all of the state. Experts estimate the aquifers contain more than a quadrillion gallons of fresh groundwater and in the past, this was able to provide nearly all the state’s water needs. There are more than 50,000 miles of rivers and streams, 7,700 lakes, 4,000 square miles of estuary, three million acres of wetlands and about 600 springs within the state (Salamone, 2002).

Residents receive approximately 53 inches of rainfall annually or approximately 150 billion gallons of rain a day. 110 billion gallons a day (38 inches annually) evaporates in the heat, and another eight inches runs off into other bodies of water. This leaves approximately seven inches of rain to be absorbed into aquifers (Salamone, 2002). Since 1950, underground aquifer levels have dropped between 10 to 15 feet in many areas (Salamone, 2002). Recent severe statewide droughts have further depleted water aquifer levels. In addition, geologists report,
A hydrologic divide interrupts the movement of Florida’s ground water and surface water. The divide is represented by an approximate line extending from near Cedar Key on the Gulf Coast to New Smyrna Beach on the Atlantic Coast. Little, if any, surface or ground water moves across this border. Most major rivers north of the line receive part of their discharges from outside Florida, in addition to rain. South of the divide, rain is the sole water source. Hydrologically, the half of Florida south of the divide is an island. About 75 percent of the state’s populations live in this area in peninsular Florida (Florida Department of Environmental Protection [FDEP], 2000, p. 21).

Before 1845, this disparity in water distribution was not obvious due to the swamp-like nature of the landscape in many areas, which restricted early colonization to the coast and panhandle.

Second, after achieving statehood in 1845, large-scale drainage of swamps and marshland, land reclamation, and flood control projects were actively encouraged in order to promote growth. Because of the abundance of water available, the state subscribed to the riparian water rights doctrine, which George William Sherk described as:

The right of a landowner whose land adjoined a stream or lake to make a reasonable use of the waters on the riparian lands. This right was subject…to the reasonable use of the water by other landowners similarly situated. In times of shortage, natural uses (domestic and livestock purposes) were preferred over other, artificial uses of the water (Sherk, 1983, p. 129).

In 1949, the Central and Southern Florida Flood Control District was created. This was the state’s first water management district and “was a taxing authority designed for multipurpose water management” (Webster and Morgan, 1983, p. 247). In the late 1960s, recurring floods and droughts, coupled with the surge in population, brought a number of water-related concerns to the attention of state officials including, saltwater intrusion, groundwater shortages, and unregulated dredge and fill activities.
In 1971, Governor Ruebin O’D. Askew called for a conference on Water Management in South Florida to develop a plan to deal with the water shortage problem (Webster and Morgan, 1983). From this conference the Water Resources Act of 1972 was developed. This act established five Water Management Districts endowed with planning, management, and regulatory powers. In 1976, voters also elected to give the districts taxing authority (Webster and Morgan, 1983). The five districts are: the South Florida Water Management District (formerly known as the Central and Southern Florida Flood Control District); the Southwest Florida Water Management District; the St. Johns River Water Management District; the Suwannee River Water Management District; and the Northwest Florida Water Management District. To avoid political favoritism the water management district boundaries were designated over hydrologic boundaries (Purdum, 2002). A nine-member board appointed by the Governor and confirmed by the Florida Senate governs each district.

Each district is responsible for water supply (including conservation and allocation), water quality, flood protection, and natural systems management within its boundaries. The Legislature mandated the districts to “develop comprehensive water use permitting requirements covering well drilling, water withdrawals for consumptive uses, dredge and fill activities, and surface water discharges” (Boggess, 1997, p. 56). Furthermore, each district is required to update their respective comprehensive plan every five years (Florida Administrative Code Chapter 62-40.531(1)(a), 2002).

In 1981, the Florida Department of Environmental Regulation (now known as the Department of Environmental Protection) adopted a State Water Policy. This policy calls for water management districts to promote the development of local and regional water
supplies within districts rather than transport water across district boundaries (Florida Administrative Code Chapter 62-40.310, 2002). The policy also established specific criteria for the transport of water and mandates that each affected district must approve all transports of water across district boundaries. In 1997, the Water Resource Act was amended to require:

The five water management districts to initiate regional water supply planning in all areas of the state where reasonably anticipated sources of water were deemed inadequate to meet year 2020 projected demands. Each plan must include a list of alternative water source options to meet anticipated demands while sustaining water resources and related natural systems (FDEP, May 2002, p. 2).

In addition, the Legislature passed the Florida Forever Act in 1999. The act replaces Preservation 2000 and provides $300 million per year for land acquisition, water resource protection and supply, ecosystem restoration, and urban parks and open space (Purdum, 2002).

Following the 2002 Legislative Session, the Legislature passed Senate Bill 1906, which mandated the coordination between local government comprehensive plans and the regional supply plans prepared by the water management districts. Each local government is now required to incorporate its comprehensive plan with the district regional water supply plan. Many special interest groups argue that while these measures represent positive steps in the right direction, they are woefully inadequate in addressing future population estimates (Florida Water Coalition, 2003).

Third, Florida has the fourth largest population in the United States and ranks twenty-second in total land area (FDEP, May 2002). Current growth calculations estimate that the state’s population grows by about 4,500 persons each week (Salamone, 2002). It is estimated that by 2020 the state’s population will have increased from 15.8
million in 2000 to more than 21.8 million (DEP Implementing Regional Water Supply Plans, 2002). As the population increases, water use is expected to increase by almost 30 percent from 7.5 billion gallons a day in 2000 to approximately 9.1 billion gallons a day in 2020 (FDEP, April 2002).

Currently, agriculture accounts for almost half of the water withdrawal in the state at approximately 3.2 billion gallons a day. Households and businesses account for about a third at approximately 2.4 billion gallons a day. While the rest (approximately 1.6 billion gallons a day) is utilized by industry, power generation, and recreational (Salamone, 2002). Experts theorize that this model will continue through 2020 with only a slight decrease in the percentage of agriculture water use (FDEP, April 2002).

As water conservation efforts rise, environmental groups will increase the pressure on legislators to pass laws that further strengthen the link between growth management and comprehensive planning. Those measures supported by water activists will require local governments to strengthen comprehensive plans, provide additional guidance for the development of regional water supply plans, and authorize water management districts to adopt rules for identifying preferred water supply sources (House Water Resources Committee, 2003).

Properly managing Florida’s water supply is a very important concern of state officials. Their major challenge will be meeting the needs of an ever-growing population while ensuring that an ecological balance is preserved. In order to accomplish this legislators must take into account the elements previously discussed in this section.
Literature Review

The significant literature addresses three main themes: hydrologic composition, state water policy, and popular water supply alternatives. The following works discussed below expound on these themes.

The first theme researches Florida’s evolutionary experience and the many types of water resources that have developed over time. The literature reveals a number of idiosyncrasies in plant and animal life and geographic structure that are unique to the state. Purdum points out that the abundance of water sources (i.e., sinkholes, springs, rivers, and lakes), as well as the plethora of bays, inlets, and islands, are the result of the constant rise and fall in sea level (2002). She also notes that until the turn of the 19th century transportation around the state was still largely dependent upon water (2002). State agency documents concur with these findings and further reveal that this wealth of water resources has played an important role in the tourism industry (FDEP, 2002). Indeed, freshwater springs were among the first “contemporary” tourist attractions. DEP attributes the abundance of springs to the “karst” landscaping that canvasses the state. A “karst” is defined as limestone that is exposed at the land surface and where groundwater is forced out from underground (FDEP and FDCA, 2002).

The second theme addresses how Florida’s water policy has evolved over the last 158 years. Experts theorize that English riparian law, which has been the prevailing water law along the eastern seaboard since colonial times, was a plausible form of water use before postwar population booms (Sherk, 1983). The rapid increases in state population that took place in the 1960s, coupled with severe droughts, forced officials to rethink its water policies. Purdum theorizes that by turning water into a state resource in
Chapter 373 officials were able to combine the best aspects of riparian law and prior appropriation law (which asserts that water is a property right derived from a historic claim to water) (2002).

In addition, state law now requires consumptive use permits in order to ensure that water use is in the best interest of all citizens (Florida Statutes, 2002). The literature asserts that DEP solely provides “general supervisory authority” over the five water management districts. Instead, the districts have the responsibility of fulfilling the statutory obligations of Chapter 373 (FDEP Website, 2003). Pursuant to regulations the districts are required to: perform technical investigations into water resources, develop water management plans for water shortages in times of droughts, manage consumptive use of water, aquifer recharge, well construction, and surface management, and issue consumptive use permits (FDEP Website, 2003).

Literature written by special interest groups reveals that over the past few years environmental groups such as the Florida Wildlife Federation, 1000 Friends of Florida, and Audubon of Florida have mobilized into coalitions to actively promote water conservation and alternative water use legislation (Florida Water Coalition, 2003). During the 2003 Legislative Session they worked alongside legislators in an attempt to pass several water resources bills which emphasized: increased water conservation, development of additional water supplies, and the increased use of reclaimed water (Florida House of Representatives, 2003). Moreover, although none of the bills passed, state officials and environmental lobbyists agree that these bills will appear again during next year’s legislative session.
Finally, the last theme illuminates the prevalent trends in water conservation and alternative resource supply. The literature reveals that water conservation methods, such as water reclamation and reuse, are mandated in law in Chapters 403 and 373 of the Florida Statutes. Since 1986 domestic wastewater facility capabilities in the state have increased from 362 million gallons per day to 1,116 million gallons per day in 2000 (FDEP, 2002). Dresser and McKee reveal that St. Petersburg is considered a worldwide pioneer in urban water reuse (1992). The city has been utilizing reclaimed water since 1978, and today operates one of the largest systems in the world. DEP states that overall benefits from water conservation could include: saved dollars due to efficiency improvements instead of the development of new infrastructure; expanded supplies because increased demands are met only through existing water supplies; and environmental protection because conservation helps protect Florida’s natural systems (FDEP, 2002).

Further readings into the literature find that alternative resource supply is another popular option. According to Matthews and Nieto, the 1997 Water Act gave local governments the statutory authority to engage in water resource development. Additionally, they state this law allows “regional water supply authorities and private parties to construct and maintain potable water supply facilities” (1998, p. 379). Talley and Reinpoldt reveal that although there is much controversy surrounding the use of desalination plants officials in the Tampa Bay area have “hailed desalination as the answer to the area’s environmental impact woes” (1996, p. 13). A desalination facility is currently under construction near Apollo Beach in southern Hillsborough County, which is expected to deliver 25 million gallons a day (mgd) of desalinated water (FDEP, May
2002). Critics of desalination argue that the process is energy intensive and dependent on the burning of fossil fuels and will increase the amount of air pollution in the area (Talley and Reinpoldt, 1996).

In summary, since 1972 Florida has set precedence for preserving its water resources and ensuring the needs of future generations are met. The expected rapid increase in population over the next fifteen years has led to a revival in water resources legislation. This manuscript adds to the research of best practices and assists in evaluating policy options for ensuring adequate future water supply. By investigating more effective solutions, it is projected that delivery to the public will become more efficient.
III. METHODOLOGY AND EVALUATION CRITERIA

Methodology

Information for this report was collected using the sources listed below.

- Analysis of academic literature utilizing library databases including GeoRef (1785-2003), Environmental Sciences & Pollution Management (1981-2003), and Lexis Nexis Academic (2001-2003);

- Evaluation of government documents from the Department of Environmental Protection and five water management districts (1967-2003);

- Review and analysis of local newspaper articles from across the state;

- 15-minute, structured personal interviews and telephone conversations and e-mail correspondence (n=six) with staff from the Florida League of Cities, Inc., staff from the Florida House of Representatives, environmental lobbyists, industry representatives, and staff from the water management districts.

The review of the academic and professional literature provided information on the three major themes that were discussed in the literature review section. Academic literature was retrieved from Web LUIS pertaining to water resource planning and management. Analysis of government documents from the Department of Environmental Protection and water management districts provided insight into the problems and practices associated with water resources. Review and analysis of media information from major newspapers across the state (i.e., the Orlando Sentinel, Tallahassee Democrat, Tampa Tribune, and Miami Herald) provided editorials and local water concern articles. Examination of applicable laws and regulations provided statutory requirements and limitations to comprehensive plans and water usage permitting.

The review of applicable Florida Statutes and Florida Administrative Chapters provided knowledge of current state regulations. It identified the procedures and
guidelines that the five water management districts and DEP follow, and some of the more popular water supply alternatives that are being promoted by the state.

A combination of personal interviews, telephone interviews, and email correspondence provided expert and special interest group opinions concerning the current water supply problems and state policies, as well as ideas for credible alternatives. Most of the interview subjects were not familiar to the researcher and were contacted on the recommendation of Rebecca O’Hara who is Assistant General Counsel for the Florida League of Cities. Ms. O’Hara provided information on the legal ramifications facing local governments as regards to specific laws and regulations.

**Evaluative Criteria**

Criteria used in the evaluation of policy options are public support/political acceptability, administrative feasibility, and cost. The decision matrix for each option is rated on an objective scale of high, moderate, and low. Supporting publications from state agencies and personal interview results will determine the rating of each option. A high rating indicates a large number of sources showing favorable support and a low rating is an indication of low support.

- Public support/political desirability gauges public opinion toward a policy option and consumer attitude toward the program when implemented. If a program has public support and is deemed desirable, then legislators may shift funds to the initiative. This was determined through evaluation of personal interviews and analysis of Lance DeHaven-Smith’s book (1991).

- Administrative feasibility examines the extent to which a program can be introduced given existing technical knowledge and staff. The data sources were professional publications and personal interviews with DEP and water management district staff.
Implementation cost examines the amount of money needed to employ an option and how the cost is distributed to consumers. The data sources were professional publications and personal interviews with DEP, legislative staff, and water management district staff.

The aforementioned criteria are representative of the main factors considered when assessing water supply alternatives. Other criteria such as efficiency costs and environmental impact could not be evaluated due to contradictory estimates found in the literature (Save Our Bay and Canals Website, 2003). These alternative criteria, while important, are secondary to the parameters of this report.

One advantage to this study is that some of the policy alternatives have not yet been attempted in Florida. However, existing data from California provided the necessary information for the analysis. Two other related policy options were considered outside the scope of this report: changing to western water rights law and privatizing water resources. Western water rights law was not discussed because of its incompatibility with current state laws and privatizing water resources was disregarded due to the extreme controversy surrounding its application (Lance DeHaven-Smith, personal interview, June 2, 2003). Despite these limitations, the most important criteria were used and it is believed that comparable recommendations would be given by any study using the methodology outlined.
IV. Policy Options

The following section identifies three policy options for future water resources in the state: water conservation, growth management, and alternative resource supply. The options are evaluated on public support/political acceptability, administrative feasibility, and implementation cost. The options chosen are representative of the most popular solutions being utilized throughout the state. The purpose is to provide policy makers with a concise comprehension of water resource supply and to direct them to the course of action that will be most beneficial to Florida and its citizens.

Option One: Water Conservation

Water conservation has the potential to preserve existing resources for future needs and is one of several initiatives emphasized in the 1997 Water Resources Act. Conservation can be accomplished through changes in technology, reduced consumption of water, increased reuse and recycling of water, xeriscaping (i.e., the use of indigenous plants that are slow-growing and drought resistant), and more efficient water use (e.g., installing high-efficiency toilets and showerheads). In recent years water conservation has become one of the most popular water resource alternatives. In 2001, Governor Jeb Bush called together the state’s top water experts to develop a statewide Water Conservation Initiative that outlines measures to improve long-term efficiency of water use (FDEP, April 2002). Also, each of the five water management districts has developed a conservation plan within their own regional water supply plan (FDEP, May 2002).
Public Support/Political Desirability

Surveys on water conservation show that while there is general widespread support for conservation initiatives, few people actually participate in local programs (FDEP, April 2002). Indeed, a 2001 Tampa Bay Water survey revealed that while 58 percent of residents agreed that protecting and sustaining the water supply is the most important reason for conserving water, an overwhelming 89 percent have never participated in a local conservation program (FDEP, April 2002). Also, perceived reductions in the state’s supply of water greatly increase the popularity of water conservation by the public (DeHaven-Smith, 1991). Conversely, public support for the option decreases when there is an increase in utility rates associated with it (Lance DeHaven-Smith, personal interview, June 2, 2003).

Most of the water management districts have partnered with area local governments to promote conservation initiatives to the general public. For example, the Southwest Florida Water Management District has been working in conjunction with local governments to fund rebate programs to replace older, less efficient toilets with new “ultra low volume” toilets. The district has also established a community education program to support community-based education initiatives (SWFWMD Website, 2003). In short, conservation has the public support and political desirability needed in order to make it a viable policy option for addressing the state’s water needs.

Administrative Feasibility

Water conservation rates highly on administrative feasibility because the statutory requirements and regulations are already in existence. Interviews with DEP staff show that they believe water conservation to be one of the most important methods for
preserving resources. Indeed, both the department and all five water management districts actively encourage conservation methods such as water reuse. For example, the South Florida Water Management District has a five-person team dedicated to developing local conservation initiatives (SFWMD Website, 2003). The district has also established a Water Conservation Funding Program to assist local communities develop and implement water efficiency measures. Also, according to Janet G. Llewellyn, the Deputy Director of the Division of Water Resource Management, DEP is currently proposing a shift in state water policy to require the continuous reuse of reclaimed water in all areas where it is feasible instead of just mandating its use during times of a water shortage (personal interview, June 27, 2003).

Conversely, while water conservation programs are popular with the public, funding from the Legislature has always been lower than that of water supply and water resource development projects (FDEP, April 2002). Interview with DEP staff reveal that because most water conservation methods are paid in full at the time of implementation legislators are reluctant to provide funding for large conservation programs. Llewellyn also revealed that most water management districts typically spend less than one percent of their overall budgets on water conservation programs. In brief, although conservation programs are administratively feasible they most often lack the funding needed to implement large long-term initiatives.

**Implementation Cost**

Implementation costs for water conservation programs can vary depending upon the type of initiative. For example, one of the least expensive programs involves changes in the utility rate structure that provide economic incentives for customers to practice
water conservation. One such form is an inclining block utility rate structure that consists of a fixed customer charge and a variable price per unit of water consumed that increases as a customer’s consumption rises (FDEP, April 2002).

Another form, implementation of water reuse facilities and retrofit projects has proven to be one of the most expensive types of water conservation. For example, it is estimated that golf course retrofit projects cost an average of $1,338 per acre (SFWMD, February 1998, p. I-14). Because implementation of these facilities requires such significant capital outlay most consumptive use applicants must find alternative funding streams to help pay for the costs of installing the system. Some of the most common funding sources for these projects come from: cost sharing, municipal tax-exempt bonds, grants and state revolving funds programs, and capital contributions (Dresser and McKee, 1992, p. 156).

In summary, water conservation programs may be some of the cheapest and most environmentally friendly options for preserving the state’s water. This approach scored high on public support/political acceptability and administrative feasibility and moderate on implementation cost.

**Option Two: Growth Management**

Growth management seeks to more effectively integrate local government and water management district activities to ensure better land use planning. It is mandated under Florida’s Local Government Comprehensive Planning and Land Development Act of 1975. According to DeHaven-Smith,

Florida’s system of growth management has three components: a framework for state, regional, and local land use planning; a process for regional review of
developments of regional or statewide impact; and a program to designate and protect areas of the state in which unsuitable land development would endanger resources of regional or statewide significance (1991, p. 27).

While there have been recent efforts by environmental groups to enhance the linkage between growth management and water resources under current law, local government comprehensive plans are only required to include a component addressing sanitary sewer, solid waste, drainage, potable water, and natural groundwater aquifer recharge (Florida House, 2003).

By January 1, 2005, local comprehensive plans will also be required to “consider the appropriate water management district’s regional water supply plan approved pursuant to s. 373.0361” (Florida House, 2003, p. 3). According to DEP staff, at that time “the potable water component must be revised to include a work plan, covering at least a ten-year period for building water supply facilities for which the local government is responsible to serve existing and new development” (Janet Llewellyn, personal interview, June 26, 2003).

Public Support/Political Desirability

According to DeHaven-Smith, the general public supports greater linkage between local government comprehensive plans and regional water supply plans because it looks and sounds good (personal interview, June 2, 2003). A recent growth management survey supports this assertion by revealing that more than 90 percent of respondents believe concurrency requirements should be continued (FDCA, February 2000). When asked whether or not concurrency requirements should be strengthened only 59 percent said they were in favor. The survey also reveals that more than 75
percent of respondents believe that greater public involvement in plan development and land regulations is needed.

Conversely, Florida League of Cities Assistant General Counsel Rebecca O’Hara states that support among local governments for greater linkage varies from city to city (personal interview, June 5, 2003). She asserts that for some cities, the concurrency requirements offer municipal officials justification for denying growth permits within their boundaries thereby enabling them to maintain a “no growth” policy. Others believe that because the water management districts and DEP have been given the statutory authority to direct water supply and development, local government involvement should remain limited to applying for consumptive use permits.

Administrative Feasibility

According to Janet Llewellyn, in the past the state did not link water management and growth planning at the beginning of the development process (personal interview, June 27, 2003). Recent statutory changes have sought to remedy this situation by requiring local governments, when they project future population growth, to also project future water supplies and to coordinate it with the water management district regional water plans. She acknowledges that the districts already have the existing authority needed to ensure that local governments meet these requirements. According to her, the problem is the lack of knowledgeable water management staff dedicated to reviewing local government comprehensive plans and reporting violations to DCA. She believes that if each district assigned staff to review local plans this would lead to better linkage.
Conversely, Rebecca O’Hara maintains that the regional water supply plans were never meant to be linked with local government comprehensive plans because they are not designed to be land use planning tools. She asserts that there is no consistency between water management districts and that the regional plans are in essence only “wish lists” of what staff believe would be a water supply or development option. Therefore, the regional water supply plans do not provide local governments with a solid planning guide for choosing water sources to the degree that they need in order to meet current concurrency requirements (personal interview, June 5, 2003).

Implementation Cost

For the five districts, the only cost for implementing greater growth management requirements is associated with shifting and allocating the funds needed to hire and train staff to review local government comprehensive plans. Llewellyn asserts that in this particular area, all five districts have recently made it a priority to dedicate the budget and staff needed to review local government comprehensive plans (personal interview, June 27, 2003).

The Department of Community Affairs has contracted with a community in each of the water management districts to prepare a pilot work plan in advance of their legal deadline. The communities are: the City of Cocoa, the City of Lake City, Okaloosa County, Palm Beach County, and the City of Venice. In comparison to the relatively low costs to the water management districts, the implementation costs to local governments would be far greater.

For example, the City of Lake City has estimated that between the years 2003 and 2012 it will cost approximately $17.7 million to repair and construct the water supply
facilities needed in order to meet future population projections (City of Lake City, 2003). City officials have proposed to fund these projects through municipal loans and bonds and the state revolving fund. Additionally, Okaloosa County has estimated that between the years 2002 and 2006 it will cost $35.4 million to repair and construct the necessary water supply facilities, which will be funded through user fees and special assessments (Polyengineering of Florida, 2003).

In summary, strengthening the linkage between growth management and water supply has both its detractors and supporters. This approach scored moderately on administrative feasibility and implementation cost and high on public support/political acceptability.

Option Three: Alternative Water Resource Supply

In many areas of the state traditional groundwater sources are not sufficient to meet future population needs. Alternative supply is an option that seeks to create new water sources to supplement already existing ones. Some forms of alternative supply include aquifer storage recovery and desalination. In order for these alternatives to be viable, long-term solutions they must be cost-effective and environmentally sustainable. All five regional water supply plans have alternative supply components and many of these projects are already on line or under construction.

For example, a SWFWMD staff member explains it has partnered with Tampa Bay Water (and its member governments) to conduct a gradual cutback in groundwater usage of the central well-field system (Palmer Mason, personal communication, June 20, 2003). Between December 31, 2002 and December 31, 2007, groundwater usage will be
decreased from 158 million gallons a day (mgd) to approximately 90 mgd through the development of alternative water sources projects.

One of the most talked about projects is the Tampa Bay Water desalination plant which, when completed in 2003, will be the largest seawater desalination plant in the western hemisphere. At a cost of $100 million, the desalination plant is projected to supply approximately 25 mgd or about one tenth of the region’s need (Talley and Reinpoldt, 1996).

Public Support/Political Desirability

According to David Arnett, a recent survey showed that,

87 percent of Florida residents recognize the need for alternative sources to meet the region’s future water needs, 91 percent agreed that water should be stored in a reservoir when river levels are high for use during dry periods, 66 percent agreed that well-field pumping should be reduced, and 81 percent said the environment would benefit from alternative supply sources such as desalinated sea and surface water (2000, p. 1).

Conversely, Tampa Bay Water conducted a 2001 survey that revealed 34 percent of respondents would not be amenable to an increase in their water bill even if an alternative water source was found that would “protect the environment and insure adequate water sources for the future” (FDEP, April 2002, p. 153).

Another major concern for residents is the potential damage that certain supply methods may cause to the environment (Lance DeHaven-Smith, personal interview, June 2, 2003). For example, Talley and Reinpoldt explain,

Desalination is an energy intensive process, using as much as 25 times the energy required for conventional pumping from the aquifer. This energy consumption is reliant on fossil fuels, a non-renewable resource... By comparison, the pumpage of groundwater, which traditionally has been used by 80 percent of Floridians, produces minimal impacts, most of which are manageable, and significant impacts can be prevented by augmentation (1996, p. 13)
They go on to discuss the dilemma of how to dispose of the salt and mineral concentrate that is produced during the desalination process. They assert that each of the current disposal options that are currently being weighed carries possible negative environmental impacts. Those methods include: surface water discharge, disposal into sewage treatment plants, deep well injection, land applications, evaporation ponds, and brine concentrators (1996). In short, although alternative supply is a popular option there are still concerns regarding consumer cost and environmental impact that hinder its desirability in some areas.

Administrative Feasibility

As with water conservation, alternative resource supply is mandated in the Water Resources Act. As such, all five water management districts have made significant efforts to ensure that their regional water supply plans have an alternative water resource component. Although alternative resource development varies greatly between the districts each has staff assigned to oversee funding and implementation of that region’s programs. One of the most common forms of alternative resource supply is aquifer storage recovery (ASR), where water is injected into the aquifer through specifically designed wells and then later recovered and used as drinking water. According to DEP staff, there are currently over 35 ASR sites located throughout the state (Janet Llewellyn, personal interview, June 26, 2003). In brief, because alternative supply development is mandated by law districts will continue to implement these programs.

Implementation Cost

Implementation cost is perhaps the most constraining aspect of developing alternative water supplies. Because these alternatives are generally more expensive than
what citizens are used to, two opposing views have arisen to pay for these projects. The first stresses the importance of government subsidies to ensure that major increases in cost are not passed onto consumers. The other belief is that burden of cost should be the responsibility of the user. The logic behind this belief is that people should have to pay accordingly for their consumption of water. Because the second belief is seen as politically unpopular, most local governments are opposed to it and actively seek other funding streams to ensure that utility rates are not increased.

Also, some alternative projects are more expensive than others. For example, seawater desalination is more expensive than brackish water desalination because it requires more treatment and is harder to convert to drinking water. Tampa Bay Water estimates that the cost of the desalinated drinking water will be approximately $2.08 per thousand gallons over a 30-year period. Up to 90 percent of the cost is expected to be offset by funding from the Southwest Florida Water Management District (SWFWMD) to ensure that utility rates for local residents remain relatively stable (Tampa Bay Water Website, 2003). Conversely, the SWFWMD has estimated that it would cost approximately $9.5 million to build four ASR wells in the Largo/Clearwater area. Over a 30-year period this would cost consumers approximately $1.28 per thousand gallons (SWFWMD, August 2001).

In summary, population projections suggest that some form of alternative water resource supply is needed as a supplement to existing water supplies if future needs are to be met. This approach scored high on public support/political acceptability and moderate on implementation cost.
V. CONCLUSION

This report presented three water resource policy alternatives to ensuring the future of Florida’s water supply: (1) water conservation, (2) growth management, and (3) alternative resource supply. Each alternative was evaluated based on public support/political acceptability, administrative feasibility, and implementation cost. Table one summarizes the results.

Table 1 –Summary of Policy Alternatives and Evaluative Criteria

<table>
<thead>
<tr>
<th>EVALUATIVE CRITERIA</th>
<th>Public Support/Political Acceptability</th>
<th>Administrative Feasibility</th>
<th>Implementation Cost</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Conservation</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2.667</td>
</tr>
<tr>
<td>Growth Management</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2.333</td>
</tr>
<tr>
<td>Alternative Resource Supply</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2.667</td>
</tr>
</tbody>
</table>

Ranking Scale: High = 3; Moderate = 2; Low = 1
All three of the alternatives would provide needed choices for ensuring the future availability of water in the state. In fact, all should be utilized to guarantee that a well-balanced and effective system of supplying water.

Option one, water conservation, ranked high on public support and political acceptability because of its favorable view by residents and the perceived need to sustain and protect existing water supplies. The option also received high marks on administrative feasibility because of the emphasis placed upon it in the Water Resources Act and the view held by DEP staff and water management district staff that conservation programs should be actively encouraged and pursued. Yet, water conservation ranked moderately on implementation costs because of the expensive capital outlay needed for such projects as reuse and reclamation. Also important is the reluctance of the Legislature to fund these programs at the same level as that of water supply and resource development projects.

The growth management alternative, option two, ranked slightly lower than the other two. The option received a high ranking for public support and political acceptability because of higher survey ratings. Conversely, it received only moderate ratings for administrative feasibility and implementation cost because of the belief that attempting to link growth management and water resources is akin to that of comparing “apples and oranges” and the high cost associated with having to meet statutory requirements.

The third option, alternative resource supply, ranked the same as the first for all three evaluative criteria. Like the first option, this one was found to be highly favored by the general public and mandated in the Water Resources Act. The option received
moderate rankings for implementation costs because of the expensive nature of projects and the need for additional funding sources to offset the costs passed down to consumers.

Florida should continue to concentrate on strengthening all three policy alternatives through an integrated resource planning (IRP) method. Because demands for water, and actual water supplies, are not consistent among the water management districts, staff should continue to perform needs assessments to determine the best course of action for their region. According to DeHaven-Smith and Wodraska, “IRP is a technical methodology for forecasting needs, delineating alternative supply options, and choosing among different supply combinations” (1996, p. 367). Through this method, water management districts (and local governments) utilize components of each of the options to guarantee a comprehensive, balanced system of water consumption and use. IRP ensures that alternative resource supplies are developed that enables the continued existence of groundwater through conservation programs. It also encourages cooperation between local governments and water management districts when projecting future population growth and development to ensure that adequate water is available in those areas.
REFERENCES


ABOUT THE AUTHOR

Shemika Spencer holds a Bachelor of Arts degree in International Affairs, with concentrations in Political Science, Latin American and Caribbean History, and Spanish, from Florida State University. She is a candidate for a Masters of Public Administration from the Reubin O’D. Askew School of Public Administration and Policy. Mrs. Spencer is interested in municipal government, budgeting, and legislative advocacy. Upon completion of her degree she plans to pursue employment at the local government level.