

Water Conservation Efforts in Florida

From the FSAWWA Florida Water Wise Committee

Miami-Dade Uses ASR for Water Storage

By Frank Calderon

To Floridians, our state's incredible population growth is no surprise. The weather and beaches have been attracting people here for centuries. But with that growth comes an increasing demand placed on our limited resources. One such resource—drinking water—has been particularly stressed in Florida in recent times. Years of drought, coupled with increased usage due to growth, have left the state and local communities scrambling to find new ways to do more with less water.

One solution that is gaining ground in Florida and elsewhere is Aquifer Storage and Recovery, or ASR. The Miami-Dade Water and Sewer Department (MDWASD) has been using ASR successfully for some years now.

What Is ASR?

ASR is a process of storing excess freshwater when it is abundant during the rainy season for later use in a well bored deep into the ground. The water is recovered from the well when needed to meet agricultural, industrial, urban, environmental, and other needs. Large volumes of water can be stored in this manner, with numerous advantages over other storage methods.

ASR Benefits

One of ASR's biggest benefits is cost. Water can be stored while capital expenditures for surface reservoirs or other forms of storage are reduced or eliminated. Also, water stored in surface facilities is subject to evaporation. Evaporation is virtually nonexistent with ASR.

ASR can also help prevent saltwater intrusion in areas that depend on coastal aquifers. Storing freshwater in the coastal aquifer displaces water native to the aquifer, which in turn displaces intruding saltwater from the ocean. Finally, ASR allows the storage of at least some of the water that traditionally is shunted out to sea to alleviate flooding in certain areas of the state, including South Florida.

ASR and Water Conservation in South Florida

The biggest problem with water conservation and management in South Florida—where MDWASD operates—is the seasonal variations in water availability that do not coincide with demand. South Florida receives an average of about 53 inches of rain each year. Unfortunately, it is not spread evenly throughout the year, nor does that much rain fall every year. Most of the rain—about 70 percent—tends to fall from June to October, also referred to as the wet season.

Drought and flooding the last few years in South Florida reminded residents that we are subject to unpredictable natural cycles. The drought that began in 2000 resulted in the strictest-ever water restrictions imposed on South Floridians. Ironically, a heavy downpour (known colloquially as the “No-Name Storm”) that brought about 12 inches of rain in October of that year—right during the middle of the drought—saw millions of gallons of water pumped out to sea to relieve flooding. “Feast or famine” is simply a fact of life with rainfall in South Florida, where it typically rains either too much or not enough.

Compounding the rainfall picture is seasonal demand. Demand is lower during the hot summer months when visitors are fewer and some residents go elsewhere—and rainfall is usually most abundant this time of year. Conversely, demand goes up during the dry winter months as tourists and part-time residents flock to South Florida.

ASR can help solve the problem of seasonal variations by allowing for water storage during the rainy season, then making the stored water available during the dry season.

MDWASD, ASR, and Water Conservation

The Miami-Dade Water and Sewer Department began implementing its ASR water conservation and management program in 1994. The department built three ASR wells at its West Wellfield, for a total capacity of 15 MGD, and two ASR wells at its Southwest Wellfield, for a total capacity of 10 MGD. Currently, only

the three ASR wells at the West Wellfield are in operation.

Freshwater is pumped from the Biscayne Aquifer when it is plentiful, from relatively shallow wells about 100 feet deep. This freshwater is pumped into the much deeper (approximately 1,200 feet) and brackish Upper Floridan Aquifer. The freshwater displaces the brackish water native to the Floridan Aquifer, creating a “freshwater bubble” that can hold hundreds of millions, even billions, of gallons of freshwater.

From the February 1999 through November 2000, MDWASD had pumped nearly 1.5 billion gallons of freshwater into the Floridan Aquifer as part of its ASR program (see Fig. 1). Some of the water recovered during 1999 was done so for testing purposes. It is even believed MDWASD's ASR program helped, albeit modestly, relieve some of the flooding caused by the “No-Name Storm” of October 2000. In any event, the bulk of the stored water proved to be of great use during the drought that began in 2000 and continued into 2001.

From December of 2000 through March of 2001—some of the drought's worst months—MDWASD was able to recover nearly 806 million gallons of freshwater. The water was mixed with water from the Biscayne Aquifer and treated at MDWASD's Alexander Orr Jr. Water Treatment Plant.

More water was not recovered at that time because of the need to create a buffer zone between water pumped into the Floridan Aquifer and water native to the aquifer, which is brackish. This buffer zone is part of what is known as Total Storage Volume or TSV, which is the water stored for

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ASR Well No. 1 at the Miami-Dade Water and Sewer Department's West Wellfield.

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recovery purposes plus the water stored to create a buffer zone. The poorer the quality of the water native to the storage aquifer, the larger the buffer zone needs to be. But, theoretically, once a buffer zone is established, recovery of stored water nears 100 percent.


One issue MDWASD and other agencies will have to consider in the future is the quality of water being stored in ASR wells. The Florida Department of Environmental Protection has brought up the issue of treating water prior to storing it via an ASR well. MDWASD is currently looking into the feasibility of ultraviolet treatment prior to storing the water. This would not eliminate

treating the water after it is recovered, which is necessary to meet federal and state drinking water standards. This additional procedure would add to the expense of using ASR.

Conclusion

ASR has been in use in the United States since 1969 (at Wildwood, New Jersey), and in Florida since 1983 (in Manatee County). This relatively new technology has proven itself viable not only at MDWASD, but also throughout the United States and, indeed, the world. It is now even being planned as a part of the Comprehensive Everglades Restoration Project (CERP), with more than 300 ASR wells proposed for use mostly south

of Lake Okeechobee.

More than 37 ASR projects throughout the state either currently exist or are in the planning stages, including those at MDWASD. As Florida's population continues to grow, so will the demand for fresh drinking water. ASR will surely continue to be a favored method for storing water when it's plentiful, and recovering it during dry spells. It certainly has proven its usefulness in Miami-Dade County, where it was put to the test during the drought of 2000-2001. 

Frank Calderon is an information officer with the Public Affairs Section of the Miami-Dade Water and Sewer Department.

Senior Water Resource Training Sets Sail in Hillsborough

By Norman Davis

The Tampa Bay area continues to feel the impact of its worst drought in recorded history. Increased public awareness and education are crucial in helping the region deal with the effects of the drought and increased demands on water supplies. Citizens need an understanding of water resources and the necessity of conserving water year round. Although much public education focuses on children, there is little emphasis on one of Hillsborough County's specialized populations: senior citizens. It was this gap in education efforts and the great need to educate about water resources that inspired the idea for the Senior Water Resource Training (SWRT) program.

SWRT was piloted in 1999-2000 in the Miami area with funding from the South Florida Water Management District, where it was well received. The Hillsborough County Water Department contracted with Pandion Systems, an environmental education and training company, to implement SWRT in the Sun City Center community in the southern part of the county.

SWRT's goal is to recruit and teach citizens to be Senior Water Resource Educators for the community in which they reside. The basic concept is to teach an underutilized but experienced segment of society—senior citizens—about vital water resource issues in the Tampa Bay area. The participants subsequently teach peers what they learned, creating an information network about water in Hillsborough County.

SWRT Format

SWRT is designed to incorporate the knowledge, skills, energy, and enthusiasm of retired citizens. The objectives for the Hillsborough County SWRT program are to raise people's awareness regarding water conservation and water resources by:

- Teaching SWRT participants about pertinent water issues affecting the Tampa Bay area (conservation, xeriscape landscaping, alternative water sources, water as related to development);
- Training participants about ways to monitor water use in their home and community;
- Giving participants the tools and knowledge to teach others about water resource issues;
- Providing information on where to learn more about water-related issues so participants can pass this knowledge on to others;
- Developing a model for senior water resource education training that can be replicated easily.

Course Format and Curriculum

The course uses an interactive workshop format for two days a week over a month-long period. The workshop combines lecture, discussion, activities, guest speakers, and field trips to spark the interest of participants. Day one of each week consists of in-class presentations and activities, and day two builds on the previous day's information via a field trip to a water-related site in the county.

Guest speakers covered topics ranging from home water conservation to large projects proposed in Hillsborough County, such as the desalination plant in Apollo Beach. Speakers included presentations from the Hillsborough County Water Department, Tampa Bay Water, and the Cockroach Bay Users Group. These talks

created a good bridge between the activities and discussions and actual examples that occur within the community.

Field trips took participants to:

- The Lithia Water Treatment Plant for a tour and presentation on the plant, followed by lunch at Lithia Springs Park;
- Myakka River State Park, where they took an airboat ride to see the lake and hiked on the canopy walk (a suspended walkway above the tree canopy); and
- The County Cooperative Extension office in Seffner, where they participated in a WaterWise workshop and visited a demonstration area of micro-irrigation.

Besides giving participants the opportunity to see examples of what had been discussed the previous day, the trips also created a connection between water sources and water use. Participants reported a much better understanding of water issues and course topics following field trips.

Course Results

Pre-tests and post-tests were given to participants to assess their knowledge about water issues. The tests indicate an increase in knowledge about water resources. This data will be combined with the results from a second offering of the course slated to run in the fall of 2002.

The course evaluation asked participants for feedback on how the course benefited them and how the training could be improved. Since this was the first such course in the county, the feedback will be instrumental in creating future programs. Part of the evaluation asked participants to rate several aspects of the course, using a Likert-type scale from 1-5 with 5= strongly agree (liked very much) and 1= strongly

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disagree (greatly disliked). SWRT received scores of "4" and "5" for all topics listed including: course organization, course content, handouts, trainer professionalism and responsiveness, visual materials, and course relevance.

During the final course week, participants discussed things that they could do within their communities to help others learn about water issues. They were given Outreach Reporting Sheets and asked to write down any type of outreach they did regarding water resources between the date of the last class, March 27, 2002, and a follow-up meeting on April 24, 2002. Outreach was determined to be any time a SWRT participant shared information about water issues through a presentation, conservation activities, a project proposal, or a conversation with others about the issues.


On April 24, only 50 percent of the participants returned an Outreach Reporting sheet, but despite the smaller-than-desired return, the participants' outreach efforts had reached over 150 people in less than one month. Their methods included setting up displays of water conservation and xeriscape items; installing a micro-irrigation system at a local nature center; giving presentations to community

groups about micro-irrigation; collecting water-related articles and sharing them with others; telling peers about water issues; speaking with local builders and property managers about installing xeriscape landscaping in their community; and giving presentations on the benefits of xeriscape landscaping.

One of the biggest challenges for SWRT is recruiting participants; senior citizens are most likely to participate in a program they are familiar with. A program as unique as SWRT requires that participants be recruited through contacts that are thorough, continuous, and based on a source that community members trust.

Participants in the March course were positive, enthusiastic, and interested in teaching others about water conservation issues; however, participant numbers were lower than the 20 participants Pandion had anticipated. To better market the training, a partnership was sought that would enhance publicity about SWRT while providing the partner with a ready-made program to add to its training opportunities. Pandion is working with Hillsborough Community College's Department of Continuing Education to offer SWRT through the college's new branch, opening in the Sun Point area in the fall of 2002.

SWRT offers senior citizens the opportunity to learn more about their community water issues through an in-depth, interactive course that uses a variety of methods to engage and educate participants. The course targets senior citizens because they are an active, vital, and aware part of the Hillsborough County community, and will take the time to educate their peers about water issues. Teaching people who then share what they learned with others creates an information network that helps increase awareness throughout the community. SWRT helps seniors not only to become water educators for their peers, but role models for generations to follow.

The SWRT program is a model for water conservation education that can easily be replicated in any community statewide. For more information, contact Christine Denny of Pandion Systems by phone at 352-372-4747 or e-mail at **cdenny@pandionsystems.com**, or contact Norman Davis, water conservation manager for Hillsborough County, at 813-272-5977 x 2305 or **davisn@HillsboroughCounty.org**. 

Norman Davis is the water conservation manager for Hillsborough County.

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Reclaimed Water & Private Wells: Integrated Approach to Landscape Irrigation

By Joan Bradshaw

Water conservation has become an integral component of Florida's overall water management program. Increased urbanization and periodic drought have placed growing demands on water supplies. As the demand for potable water continues to grow, water efficiency and conservation measures offer promising alternatives to the development of new supplies.

The Use of Reclaimed Water For Irrigation

Data indicate that approximately 30 to 50 percent of the total water consumption in a typical Florida community can be attributed to landscape irrigation. With its population of 248,000 surrounded on three sides by Tampa Bay and the Gulf of Mexico, the city of St. Petersburg is focused on maximizing the use of reclaimed water and private well water for landscape irrigation to help conserve potable water resources.

St. Petersburg initiated a reclaimed water system in the late 1970s. A study conducted by the city determined that before reclaimed water was available, residential customers in waterfront neighborhoods used an average of 13,400 gallons per month of potable water for indoor and irrigation purposes. Following connection to the reclaimed water system, potable water usage immediately dropped and remains constant at approximately 6,800 gallons a month per residence.

The use of reclaimed water for irrigation has several advantages over using either potable water or shallow groundwater wells.

- Application of approximately 1½ inches of reclaimed water per week provides 50 percent of the nitrogen, phosphorus, and potassium requirements for horticultural and agricultural purposes, reducing fertilizer costs for customers.

- Reclaimed water does not stain structures, nor does it have a hydrogen sulfide smell characteristic of some shallow wells in St. Petersburg.

- Applying reclaimed water to the landscape does not require an irrigation pump,

since reclaimed water is delivered with adequate pressure to operate an irrigation system properly.

- Reclaimed water is far less expensive than potable water. All potable water used is subject to additional sewer charges, with no maximum usage cap.

Since reclaimed water is an excellent alternative irrigation source, why not provide reclaimed water to all St. Petersburg customers? Even if funds were sufficient to make the service available to every household in the city, the supply of reclaimed water is insufficient to serve all customers.

In fact, maintaining an adequate supply for reclaimed customers has been the challenge. St. Petersburg currently has around 10,000 customers using approximately 20 to 25 mgd of reclaimed water on an annual average basis, as opposed to the city's 90,000 potable-water customers. The average 7,000-square-foot residential lot in St. Petersburg typically requires about 30,000 gallons of irrigation water monthly during the dry spring season. The average home discharges approximately 6,000 gallons per month into the sanitary sewer system, requiring five sanitary sewer customers in order to provide an adequate supply for one reclaimed water customer—assuming that reclaimed water customers use a reasonable amount of the product.

Although many reclaimed water customers are not metered, a spot check of representative users showed 20 percent overuse, with some residents exceeding 100,000 gallons monthly. If the system is to be expanded to serve additional customers, conservation measures such as permanent water restrictions and volumetric use charges would need to be implemented.

Also, the unused reclaimed water currently disposed of during the rainy season must be stored until needed during the dry season. This "seasonal storage," estimated at 500 million gallons, is too costly to be stored above ground due to the cost of the structure and substantial land requirements; however, the city is currently evaluating whether Aquifer Storage and Recovery (ASR) (storage within underground rock formations) is a viable method of seasonal storage.

Efficient Irrigation

To encourage efficient use of water resources, a Sensible Sprinkling Irrigation Evaluation Program was established in 2001, cooperatively funded by St. Petersburg and the Southwest Florida

Water Management District (SWFWMD). The city entered into an agreement with an irrigation contractor to provide participants with an in-ground irrigation system evaluation to determine efficiency, site-specific recommendations on appropriate modifications, and installation of free water conservative irrigation devices. Also, seasonal mandatory water restrictions have been placed on reclaimed customers in times of extreme drought.

The Use of Private Wells For Irrigation

The use of private wells is also being investigated to meet the growing irrigation needs for landscape maintenance. In the fall of 2001, St. Petersburg received a variance from the SWFWMD allowing private well owners within the city's water service area to return to two-days-per-week watering restrictions as part of the city's long-term water resources management plan. The city anticipates that the variance will encourage private well owners to use this alternative source for irrigation, lessening the use of potable water.


Private well owners were encouraged to register with the city to begin the two-days-per-week schedule. Customers could register their well online or by telephone using an automated line. Postage-paid cards were created to provide a simple method of registering the wells and obtaining information on them. Customers were informed that a site inspection may be scheduled to verify the existence of the private well.

To date, information from more than 5,300 well registration cards has been entered into a city database, providing an opportunity to collect relevant information which could be used to determine favorable locations for future private irrigation well installation programs.

Efforts are also underway to identify consistent, quality groundwater sources for future landscape irrigation. The city is proposing a study to determine the feasibility of expanding the utilization of the shallow, surficial aquifer for irrigation in an attempt to further reduce the consumption of potable water. This cooperatively funded project is sponsored by the city and the SWFWMD. The goal of Phase I, proposed for fiscal year 2002, is to identify areas within the city where good-quality shallow ground water is available. Another important element is to determine the sustainable level to which this resource can be utilized.

Phase II, proposed for fiscal year 2003, will target customers who use large amounts of potable water to launch an incentive program for private well installation.

In addition, citizens will be asked for their perceptions and interest in participating in a private-well rebate program in specified areas of the community. St. Petersburg water customers who use potable water for irrigation and live in an area having quality irrigation water will be eligible to participate in the incentive program. In addition to the well incentives, a broad-based public awareness program will be developed to encourage efficient use of all water resources.

Water conservation comprises several elements, each designed and administered with the goal of efficient water use and effectively reducing the potable water used within the St. Petersburg service area. To be effective, water management must be balanced and multi-faceted to maximize the efficient use of potable water, reclaimed water, and private well water without endangering these crucial resources. 

Joan Bradshaw is a conservation coordinator with the St. Petersburg Public Utilities Department.

High Finance for Pinellas County 8th Graders

By Cathy MacLaren

For over 10 years, more than 14,000 fifth-grade students have experienced the world of big business and high finance through a combination of classroom learning and hands-on experiences at Pinellas County School Board's Stavros Institute. The institute partners with local businesses and government agencies to provide a unique educational experience that uses several weeks of in-class "book learning" as a capstone for the one-day interactive economic lesson at a mock city called Enterprise Village, where students get a taste of running a business, holding a job, and receiving a paycheck.

Building on the success of Enterprise Village, the institute developed an eighth-grade curriculum based on financial responsibility and budgeting. Finance Park opened to Pinellas County students in 1999. For the six weeks prior to their visit, the students begin learning economic and life skills

in the classroom. Once at Finance Park, students receive a lifestyle scenario on which they base their personal budget. For example, a student's scenario may state that she or he has two children, a husband or wife, and a job that pays \$25,000 a year. Armed with this information, students must design a realistic budget based on their income.

Different businesses and agencies have partnered with Finance Park to create business centers where students pay their bills and make personal financial choices throughout the day. In the process, students begin to understand the importance of, as well as the juggling involved in, creating a working budget.

When designing the Pinellas County Utilities business learning center, Utilities Communications Solution's Director Irma Reinpoldt wanted to make sure each eighth grader understood both the fiscal and environmental benefits of resource conservation, so the utilities staff created a utilities bill worksheet to help students determine their monthly utility bill. The worksheet bases each student's water usage on the daily national average of 150 gallons per person. When students compute their water and sewer usage for their household

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based on this number, the figures often exceed the dollar amount allowed for their water bill in their budget.


The second half of the worksheet offers them practical conservation suggestions, such as installing low-flow showerheads, and ties these choices to a water and dollar savings amount. Students may also reduce their solid waste collection services or opt to bring their recycling to a centralized collection center, rather than receive curbside service. Once the students make their conservation choices, they subtract the appropriate amount from their total utility bill, bringing their utilities cost

(both financial and environmental) down to a more appropriate level.

Students may participate in an interactive survey that measures their water consumption based on their habits. Students are asked about low-flow devices, pool covers, and general water use, such as dishwashing and irrigation. As they answer the computer's questions, a bar graph on the left side of the screen either fills with water or drains water, depending on the answers.

At the end of the survey, the program generates a printout that shows students how much water they use each month, ways they can conserve water, and how much water they could save by using vari-

ous conservation devices. The program also has the capability to convert the gallon consumption into a dollar amount.

Pinellas County Utilities, having reduced its potable water usage by 28 percent over the past decade, created this program to teach students the relationship between conserving resources and saving money. By associating resource conservation with smart money management, the utility hopes to help motivate the next generation to look for even more ways to conserve resources. 

Cathy MacLaren is a public relations specialist with Pinellas County Utilities.

Sarasota County Passes Unique Conservation Measure

By Michael J. Holsinger

Coastal communities throughout the United States are facing increasing challenges in coping with limited water resources. Sarasota County on Florida's Gulf Coast is using a combination of public education and regulation in addressing the need for its citizens to conserve water.

The significant drought experienced in Southwest Florida over the past two years, coupled with continued growth, has put serious pressure on water resources. Sarasota County has used high water rates to discourage water waste. The county also has a unique demonstration education facility, the Florida House Learning Center, which shows citizens how to conserve water and other resources in their own home and yard.

In 2001, the Florida Legislature amended state statutes to require that all counties and municipalities examine the feasibility of establishing water-conserving ordinances.

The Sarasota County Commission passed such an ordinance in November that became effective January 13, 2002, for all new development and significant renovations to existing development.

The ordinance was not developed by county staff members working in a vacuum, but in conjunction with customers such as the local homebuilders association. The effort produced a "self-regulating" ordinance that Sarasota County believes

will be simple to follow while having a positive impact on water resources.

The ordinance does not impose fees. It does not require plan reviews or inspections. Instead, it relies on a Compliance Certification Checklist, which is completed by licensed builders, landscape contractors, and irrigation contractors confirming that the landscape plant and irrigation installation follows ordinance stipulations.

The new ordinance focuses on two elements: (1) ensuring that irrigation systems operate efficiently and (2) limiting plants that require the most supplemental irrigation. It contains the following provisions:


- It applies only to landscape areas irrigated by a permanent in-ground system.
- Grass and annual flowers are limited to 50 percent or less of the irrigated area.
- Separate irrigation zones are required for grass and tree/shrub/groundcover beds.
- Low-volume micro-irrigation is required for plant beds along with a filter.
- No plant rootballs or spray irrigation is permitted under roof overhangs.
- No pop-up spray heads and rotors can be mixed in the same zone.
- Lawn spray patterns must overlap 75-100 percent.
- Plants will not interfere with spray coverage.
- Impervious surfaces in the planted area are limited to 10 percent or less.
- No grass will be planted in strips narrower than 4 feet except next to contiguous properties.
- Reclaimed water will be used for irrigation if available.
- The building contractor will leave an as-built drawing of the irrigation system for the homebuyer.
- The contractor will also leave a mainte-

nance checklist produced by the county for the homebuyer.

The maintenance checklist is a key element to get homebuyers to practice conservative landscape maintenance. To satisfy this requirement, a unique checklist and calendar was produced cooperatively by the County Extension Service and Environmental Services in full-color laminated 11"x14" format so it can be kept next to the irrigation controller in the garage for easy reference. The checklist is designed for the Central and Southwest Florida climate zone. Adaptation to other areas would require some revisions.

Exempt from the ordinance are landscaping with no in-ground irrigation system, athletic fields and golf course play areas, grass in stormwater management areas and public rights-of-way, cemeteries, agricultural production operations, and community play areas.

Since the ordinance depends on self-regulation, the Extension Service obtained a grant from the Southwest Florida Water Management District to fund a professional to work in the field with contractors to help them become familiar with correct installation practices.

This grant will include developing Best Management Practices in both written and electronic form, touch-screen computer kiosks, exhibits and displays, model landscapes, and "friendly informal inspections" of landscape and irrigation installations. 

Michael J. Holsinger is an extension agent and director of the Sarasota County Extension Service, Institute of Food and Agricultural Sciences, University of Florida.

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Water Workshops for Teachers: Successful Partnership

By Lloyd Hathcock

The city of North Miami Beach began its water conservation program in 1999, at the genesis of Florida's worst drought in history and on the threshold of the nation's largest public works project, restoring America's Everglades. Led by the program coordinator, utility managers began evaluating the benefits, costs, and community impact of various water education measures. One result of the process was an effort to establish fruitful relationships with local schools and educators. In a unique partnership with the South Florida Water Management District (SFWMD), the city's public services department has implemented water resources education workshops for teachers using the curricula of *Project WET (Water Education for Teachers)*; *Discover A Watershed: The Everglades (DAW)*; and *Conserve Water Educators Guide*.

Evaluating Options

As a first step toward expanding its water plant, the city's public services department began compiling a water use application for the SFWMD. One required component of the application is implementing education measures. Since no specific education measures were prescribed by the SFWMD, utilities could interpret the mandatory measure in ways ranging from simple bill stuffers to expensive, contracted education services.

Before the department's water conservation division was created, utility education measures were limited to occasional classroom presentations and community events. Led by the program coordinator, utility managers identified three main goals for water conservation education programs: cultivating a significant presence in local schools, identifying and implementing programs with local and regional relevance, and implementing these programs in the most cost-effective way.

Programs were evaluated for content, curricula, implementation methods and costs. Several "turn key" education programs were available but were rather generic in content and too costly to be considered. Others proved cost-effective but

were also too generic. *Project WET* and related curricula were discovered to have local and regional relevance and could be easily implemented, but the question of how to implement *Project WET* in a cost-efficient way remained.

Options To Opportunities

Project WET is a nonprofit water education program for educators and young people, grades K-12, located on the Montana State University campus in Bozeman, Montana. *Project WET* and its related curricula are perpetuated through a network of state coordinators. Internet research revealed that the state coordinator for Florida worked for the SFWMD, and contacting the state coordinator by telephone led to a new water education partnership.

SFWMD administers a water education program using *Project WET* and related curricula through facilitated teacher workshops. The water district supplies the activity guides, related materials, trained facilitators and general workshop coordination, along with teacher stipends or reimbursement for substitute teachers as an additional incentive for educators. County public school teachers can also earn "in-service" credits that count toward their annual teacher recertification by attending a *Project WET* workshop.

To make the curriculum applicable to Florida's public schools, benchmarks for the Florida Comprehensive Achievement Tests (FCAT) were made available for workshop participants. These same accommodations were offered to North Miami Beach to help build a solid foundation for the utility's water education programs. By coordinating the first workshop, the city and SFWMD forged a new interagency partnership that has been expanded over the years.

The First Workshops

At first, local science teachers were targeted as possible workshop participants. Workshop coordinators decided to offer these workshops also to local nonprofit environmental educators. North Miami Beach agreed to host the first workshop at a city-owned facility, and to handle workshop marketing and registration. As a result of this effort, valuable contacts were established for future workshops and other water education measures.

To market the workshop, a simple flier was created and mailed to every school and its principal four weeks before the event. At

the same time, the flier was distributed through an electronic network of area environmental education providers. Within two weeks, the workshop was filled to capacity. An experienced facilitator was then booked to lead the session. All facilitators for *Project WET* workshops must obtain training and certification from the state *Project WET* coordinator. After a final count of registrants, the appropriate quantities of workshop manuals and other materials were procured.

Partnership Progression

In late 2001, North Miami Beach's water conservation coordinator obtained training and certification from SFWMD to facilitate *Project WET*, *Discover A Watershed: The Everglades*, and *Conserve Water* workshops in Florida. The ability to facilitate workshops independently allowed North Miami Beach and the SFWMD to mount a more aggressive training schedule. From 1999 to 2001, an average of three workshops per year were coordinated and hosted by the public services department. During the 2001-2002 school year, six workshops were completed.

The evolution of North Miami Beach's teacher workshops has also helped build credibility and a stronger relationship with the Dade County Schools Teacher Education Center. As a certified facilitator, the city's water conservation coordinator can authorize in-service credits for teachers who complete a workshop.

Evidence of Success

Among the tools used to measure the success of each workshop is a "pre/post" test. Each participant is administered a multiple-choice pre-test before the workshop begins. A post-test administered at the end of the workshop contains the same questions as the pre-test. Before the workshop is adjourned, both tests are graded and each question is discussed. Statistics show a considerable gain in knowledge of local, regional, and general water issues.

A workshop evaluation form is used to assess the participants' opinions on workshop materials, curriculum, facilitator, and logistics. Thus far, all workshops have met or exceeded the expectations of the participants.

The *Project WET* and related workshops coordinated by North Miami Beach and the SFWMD have helped establish other fruitful partnerships that promote

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Water Workshop

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water education in South Florida. Two active partners in North Miami Beach's Water Fest and Drinking Water Week 2002 were introduced to the city staff through the teacher workshops. The Earthman Project and Miami-Dade County Parks personnel are using the knowledge gained in the workshops to shape North Miami Beach's water celebrations. Several other nonprofit agencies are partnering with the city to promote common water-education goals.

Florida's worst drought in history brought a renewed attention to water education in area schools. Also driving this

renewed interest is the Comprehensive Everglades Restoration Plan, touted as the largest public works project in United States history—a project that will directly affect each person who calls South Florida home. Equipped with FCAT prompts, teachers who have attended the workshops find it easy to incorporate many of the activities in their classrooms.

The SFWMD has cited its partnership with North Miami Beach as a benchmark for a utility water-education measure. The concept is now being advocated for other utilities in South Florida.

This thriving interagency partnership has redefined the relationship between util-

ity and permitting agency. Over 250 local educators have gained valuable tools to teach the history, contemporary challenges, and responsible stewardship of South Florida's water resources to youth. Water managers are learning from recent water crises and are developing measures to help meet future challenges. Implementing solid education programs helps build a foundation on which other water management programs can be created. 

Lloyd Hathcock is a water conservation coordinator with the city of North Miami Beach. He is chairperson of the Florida Water Wise Committee.