Protecting the Quality of Florida’s Waters with “LID” Practices

Pierce Jones
Program for Resource Efficient Communities
University of Florida
Program for Resource Efficient Communities

We promote application of design, construction and management practices that minimize environmental degradation and make more efficient use of energy, water and other natural resources in master planned residential communities.
Program for Resource Efficient Communities

Active on-campus faculty include:

• Glenn Acomb Landscape Architecture
• Ondine Wells Environmental Horticulture
• Mark Clark Soil & Water
• Michael Dukes Ag & Biological Engineering
• Mark Hostetler Wildlife Ecology & Conservation
• Tom Ankersen Law
• Others
Growth Trends

Context
Population - Florida:

- 1980 ~10,000,000
- 2005 ~17,000,000
- 2030 ~28,000,000
Growth Trends

Building Permits - Florida:

- 2003 ~155,000
- 2004 ~185,000
- 2005 ~208,000
- 2006 ~146,000
- 2007 ~72,000
Growth Trends

The Bonita Bay Group™ offers exceptional community living with its environmentally sound development philosophies and innovative designs. Residents enjoy traditional neighborhood gathering spots, recreational facilities and access to community parks that blend seamlessly with surrounding habitats.

Distinctive Lifestyle Experiences

[Logos and names of community areas]
Growth Trends

For more information on a specific community, click on any area of the map.
Growth Trends
South Pasco County

Growth Trends
Growth Trends

Lake County
Growth Trends

Baker County
Growth Issues

Water Supply
200,000 Gallon Water Tower
Water Supply

Florida Freshwater Withdrawals
(in million gallons per day)

- Ground water
- Surface water

Source: U.S. Geological Survey

Tampa Bay Water Desalination Facility
Water Supply
TWA DISCUSSION ON WATER ISSUES:

- SFWMD/WUP capped at projected 2013 demand (36.5 mgd)
- WUP approved for 36.5 mgd for groundwater withdrawals
- Projected demand by 2030 is 87.9 mgd (51.4 mgd)
- AWS to meet demand after 2013
- Pursuing policies to reduce irrigation demand
- TWA Board approved Florida Water Star program for future residential development.
Water woes hit development

EDITOR’S NOTE: This is the first in a series examining how the region’s drinking water is running low.

BY SUSAN STABLEY

South Florida has run out of natural sources of drinking water and will likely experience halted development due to the problem.

Major real estate projects in the tri-county area must be curbed until alternative sources of water can be developed, according to the state. Already, it has told Miami-Dade County to reject 17 large-scale projects because of drinking water scarcity.

And the creation of alternative water sources will not happen soon. The work will cost of hundreds of millions of dollars and can take decades to complete, according to estimates from regional and local water officials.

“For us to go back into a built environment is a very expensive proposition,” said Doug Yoder, assistant director of Miami-Dade County’s water and sewer department.

Last week, Gov. Jeb Bush vowed to make South Florida confront its water issues before the state will approve any more large projects.

“It makes no sense to develop west and west and west without the adequate development of infrastructure and water supply,” Bush said at the Urban Land Institute’s Symposium on Regional Cooperation on March 17.

See WATER, Page 62
The St. Johns River as a Drinking Water Source

In many areas of the St. Johns River Water Management District, groundwater supplies have reached their sustainable limit. Water demand in the District is expected to nearly double by 2025, and fresh groundwater from the Floridian aquifer will not be able to meet all future needs.

Water conservation will continue to play a vital role in sustaining Florida’s water supply, but will not solve the water supply challenges facing our region. Alternative sources may include … surface water from our rivers.
Water Supply

>50% Decrease in Irrigation

Soil Moisture Sensor Controller
Growth Issues

![Graph showing irrigation and precipitation from November 2006 to July 2007.]

- **Irrigation Water (in):**
  - Nov: 0
  - Dec: 0
  - Jan: 0
  - Feb: 4
  - Mar: 8
  - Apr: 12
  - May: 16
  - Jun: 0
  - Jul: 0

- **Precipitation (in):**
  - Nov: 0
  - Dec: 1
  - Jan: 2
  - Feb: 3
  - Mar: 4
  - Apr: 5
  - May: 9.9
  - Jun: 8.0
  - Jul: 4.6

- **Legend:**
  - Blue line: Precipitation
  - Dotted blue line: Timer Controls Only
  - Green line: Rain Sensor
  - Red line: Soil Moisture Sensor

Date (2006-07)
Water Supply

Demand for Florida homes permitted in 2005:

- Total Water Use ~20,800,000,000 Gal/yr
- Irrigation ~10,400,000,000 Gal/yr
- Sensor Controlled ~ 5,020,000,000 Gal/yr
- “Savings” ~32,000,000 $/yr
Water Supply

Demand for Florida homes permitted in 2005:

- Total Water Use: ~20,800,000,000 Gal/yr
- Irrigation: ~10,400,000,000 Gal/yr
- Sensor Controlled: ~5,020,000,000 Gal/yr
- “Savings”: ~32,000,000 $/yr
- “Retail”: ~20,800,000,000 $/yr
Pepsi says Aquafina is tap water

Labels on bottles will be changed to clarify that the water originates from public sources.

By CNN's Katy Byron
July 27 2007: 5:26 PM EDT

NEW YORK (CNN) -- Pepsi-Cola announced Friday that the labels of its Aquafina brand bottled water will be changed to make it clear the product is tap water.

The new bottles will say, "The Aquafina in this bottle is purified water that originates from a public water source," or something similar, Pepsi-Cola North America spokeswoman Nicole Bradley told CNN.

Pepsi will change current labels on water bottles to say the water comes from a public water source.

The bottles are currently labeled: "Bottled at the source P.W.S." Americans spent about $2.17 billion on Aquafina last year, according to Beverage Digest, an independent company that tracks the global beverage industry. The U.S. bottled water business in 2006 totaled roughly $15 billion, it said.
Growth Issues

Water Quality
Water Quality
Oceanic Dead Zones Continue to Spread
Fertilizer runoff and fossil-fuel use lead to massive areas in the ocean with scant or no oxygen, killing large swaths of sea life and causing hundreds of millions of dollars in damage.

By David Biello
August 15, 2008

"The primary culprit in marine environments is nitrogen and, nowadays, the biggest contributor of nitrogen to marine systems is agriculture. It's the same scenario all over the world," says marine biologist Robert Diaz of The College of William & Mary in Williamsburg, Va. "Farmers are not doing it on purpose. They'd prefer to have it stick on the land. Nitrogen is very slippery; it's very difficult to keep it on land," Diaz notes. "We need to find a technology to keep nitrogen from leaving the soil."
Water Quality

2005 Fertilizer Consumption (Tons/yr):

- Clay 1,190
- Nassau 1,540
- Duval 3,970
- St Johns 22,780
## Water Quality

### 2005 Fertilizer Consumption (Tons/yr):

<table>
<thead>
<tr>
<th>Location</th>
<th>2005</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay</td>
<td>1,190</td>
<td>5,230</td>
</tr>
<tr>
<td>Nassau</td>
<td>1,540</td>
<td>2,040</td>
</tr>
<tr>
<td>Duval</td>
<td>3,970</td>
<td>23,500</td>
</tr>
<tr>
<td>St Johns</td>
<td>22,780</td>
<td>3,480</td>
</tr>
</tbody>
</table>
Water Quality
Water Quality
### Water Quality

**Final Draft LSJRB SWIM Plan Update - May 2008**

Table C-5: Nonpoint Sources—Freshwater Nitrogen Load Allocations (as of February 2008)

<table>
<thead>
<tr>
<th>Source Category</th>
<th>Load Allocation</th>
<th>Reduction from Starting Point</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-MS4 Stormwater1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hastings</td>
<td>988</td>
<td>28.0%</td>
</tr>
<tr>
<td>Pomona Park</td>
<td>238</td>
<td>0.0%</td>
</tr>
<tr>
<td>Putnam</td>
<td>75,049</td>
<td>21.8%</td>
</tr>
<tr>
<td>St. Johns Non-Urbanized Area</td>
<td>55,972</td>
<td>6.7%</td>
</tr>
<tr>
<td>Welaka</td>
<td>1,850</td>
<td>28.4%</td>
</tr>
<tr>
<td><strong>Other Sources</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>429,264</td>
<td>37.2%</td>
</tr>
</tbody>
</table>
Nearly 14,500 tons. Almost 29 million pounds. That’s how much nitrogen and phosphorus is pouring into the lower St. Johns River each year from wastewater treatment plants and stormwater runoff, according to Florida DEP.

Now, after eight years of work, the DEP is about to finalize a plan requiring at least $450 million in expenditures by Northeast Florida utilities, governments and others to reduce their total nutrient discharge by about 26 percent. Some estimate the true costs at more than $1 billion.

The reductions are part of new Total Maximum Daily Loads (TMDLs) defined for the Lower St. Johns. A TMDL is a specific amount of nutrients the river can carry while still maintaining water quality levels, and for the Lower St. Johns, it’s 11,518 tons of nitrogen and phosphorus.
Water Quality
Water Quality

Sixmile Creek Watershed

Simulated Development

Nitrogen Load (tons/year)

- Coniferous Plantations
- Improved Pasture
- Medium Density Residential

Existing: 179
Lo IFAS: 212
Hi IFAS: 254
Water Quality

Grand Haven
Water Quality

Grand Haven
Program for Resource Efficient Communities

Low Impact Development
Low Impact Development

Principles:

• Control stormwater at the source
• Prevent and treat contamination at the source
• Think micromanagement
• Reduce imperviousness
• Minimize initial disturbance
• Preserve and recreate natural landscape features
• Increase hydrologic disconnects
• Enhance off-line storage
• Facilitate detention and infiltration opportunities
Low Impact Development

Curb Cuts & Concave Parking Island
Low Impact Development

Trench Drain to Median
Low Impact Development

Stormwater Planter w/ Scupper
Low Impact Development

Ecologically Enhanced Stormwater Retention Areas
Low Impact Development

Ecologically Enhanced Stormwater Retention Areas
Low Impact Development
(Development Scale)
Growth Trends
Growth Trends

Soil Profile
Program for Resource Efficient Communities

River Forest
Low Impact Development

River Forest
Program for Resource Efficient Communities

Madera
Madera

Reduced Impact Site Design
Madera

No Curb and Gutter
Low Discharge Landscape Design
Madera

Low Impact Landscape
Madera

Enhanced Percolation
Madera

Reduced Impact
Idylwild

Conventional Practice
Restoration

Conventional Site Design
Reduced Impact Site Design
Two years ago, plans for one of the biggest developments in Central Florida called for the usual: winding streets and an expansive golf course. Regional planners rejected it as sprawl. Now developer Don Mears has created a new plan for the development called Restoration that preserves natural areas, clusters homes and could become a model for Central Florida development.

Water:
• Before - A golf course would have gulped a million gallons daily. Large lawns would have required watering and fertilizer.
• Now - The golf course is gone. Lawns have shrunk. Moisture sensors will trim watering, using only stormwater and reclaimed water. Windmills will help pump water from ponds to irrigate public areas.
Alternative Landscapes

Summary
Summary

Design/specify alternative landscapes/practices:
• Compact design, minimize disturbance
• Rehabilitate disturbed soils
• Preserve/Re-establish shade tree canopies
• Minimize/eliminate fertilization
• Implement lot scale LID
Summary

Design/specify alternative landscapes/practices:
• Eliminate all irrigation w/ potable water
• Dual pipe, dual meter irrigation systems
• Minimize irrigation even w/ reclaimed water
• Watering trucks
• Total community water budget
Water Budgets
Pierce Jones
Program for Resource Efficient Communities
University of Florida
352-392-8074
piercejones@ufl.edu