

Florida STORMWATER EDUCATION

Resources for Stormwater Education from the Stormwater Management Academy—University of Central Florida



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Engaging Teachers and Students in Stormwater Education

Elise Cassie, Florida Stormwater Education Newsletter Coordinator

Public education and outreach must be fulfilled, and by working with our community's teachers and students, this task can be accomplished. There are many ways to incorporate stormwater education into all core subjects and since water quality affects everyone, it is easy for students to understand their impact.

Over the years though, it has become increasingly difficult to provide professional development for teachers, or to provide activities and programs for students given the stringent testing atmosphere. Despite studies concluding that students learn best when they are engaged in relevant topics, including Gerry Lieberman's work, "Using the Environment as an Integrating Context for Learning," teachers and administrators have been reluctant to take their focus away from anything they perceive as "extra."

This issue of the *Florida Stormwater Education Newsletter* will provide useful ideas about how to begin educating youth and teachers, or, if you are a veteran at educating youth, you may discover new ideas.

It's All About LIFE!

Misty Alderman, Environmental Education Specialist, Office of Environmental Education, Florida Department of Environmental Protection

Since 2004, with the establishment of the first LIFE (Learning in Florida's Environment) program at the Apalachicola National Estuarine Research Reserve (ANERR), over 3,800 future scientists and stewards have participated in unique field-based, environmental-science education programs. Each of the ten existing programs is a partnership between the DEP and a local school district and focuses not only on increasing student achievement in science through hands-on and minds-on, inquiry based labs but also offers opportunities for teacher professional development.

Three recent developments related to the LIFE program demonstrate the value of watershed-based field programs emphasizing non-point sources of pollution as an integrating context for science: 1) the Okaloosa County NPS Teacher Training; 2) the summer research experience for teachers, and 3) the development of the newest LIFE program at Werner Boyce Salt Spring in Pasco County.

Okaloosa County Teacher Training

In July 2008, the Office of Environmental Education conducted a "curriculum integration workshop" in Niceville, where Okaloosa County School district teachers spent three days learning about the Choctawhatchee Bay watershed, with a strong emphasis on nonpoint sources



Okaloosa County teacher participates in the curriculum integration workshop.

PHOTO COURTESY OFFICE OF EE, FDEP

of pollution (NPS), water quality testing, and monitoring. Teachers participated in the pilot testing of field labs, one of which included a canoe trip out into the Rocky Bayou, taking water quality measurements and noting different land uses and NPS along the shoreline. A UF-IFAS Extension agent presented a session on schoolyard service learning activities incorporating Florida Yards and

continued on page 6



Spotlight on Keith Wilson and the Sarasota County 4-H Youth Environmental Education Outreach Program

Keith Wilson, Florida 4-H extension professional, provides innovative environmental education programs for students in Sarasota County. In addition, Sarasota 4-H partnered with Sarasota County Environmental Services professionals to provide teachers the opportunity to receive credits towards a Masters in Education by completing a 10-day environmental education program. Requests for environmental education programs through the 4-H office are on the rise!

Keith began his professional work with a B.S. in Biology from Bridgewater State College in Massachusetts. He was the Curator of Marine Aquariums at Sealand of Cape Cod, conducted mollusk research, and became a Massachusetts county 4-H extension agent in 1989, where he taught environmental science classes. Keith's current position as a Sarasota County extension agent began in 1998.

Currently, Keith offers 12 different programs for youth including Shark Awareness, Stranded Marine Mammals, and others. Programs offered related to water quality include, Environmental Management, Water Con-

servation, and Groundwater Dynamics. Keith's approach to stormwater education with the Environmental Management program is of special interest.

Critical Classroom Skills

Keith's experience as an environmental science educator has led him to identify three important teaching qualities in order for classroom instruction to have an effect on both youth and adult students: First, a solid knowledge of the subject matter; second, a passion for the subject being taught; and third, the ability to engage and empower the students to interact with the teacher. "I've noticed that regardless of the age of the student being taught, there seems to be a very similar positive response by them to a teacher who displays these qualities," he said.

"When I teach stormwater runoff, water conservation, or groundwater dynamics to a group I first request their complete attention. 'Please show me the color of your eyes,' is what I typically state. Once the students' attention is captured I stress that the subject matter they are about to learn is of great value to their lives in many different ways. Water is an essential part of everyone's lives and the class will enhance [students'] appreciation for this fact."

Three dimensional displays, hand-drawn diagrams, and actual specimens—living and preserved—are used to captivate the class. Questions are welcomed at anytime during the presentation. Instead of the instructor demonstrating alone the use of a particular model or

educational prop, a student is always invited to come up to the front of the class to become the "teacher" to demonstrate to their classmates. Keith feels that this makes for a more engaging, dynamic, and fun learning experience for the group. "The mind of the student will more easily retain information you share if they are active participants," he said. "The 4-H Program I teach for has a 'hands-on' learning philosophy, which I am a firm believer in. It's hoped that students will take the knowledge gained from these workshops/classes and make any necessary changes in their lifestyles that would enhance their own and their community's quality of life."

Teacher Professional Development

Teacher professional development and educational advancement are critical for educators to feel comfortable teaching water education with their students. The 10-day Environmental Education Program that was offered in partnership with the Sarasota County Environmental Services Department included water quality, groundwater dynamics, and stormwater runoff as an extensive part of the curriculum taught. Participating educators who were later surveyed revealed that water related issues were a top priority to them in selecting environmental science topics for their classroom. This program included fieldtrips to water treatment plants and pumping stations. Elementary school teachers expressed the greatest need, compared to middle school and high school teachers, to have more environmental science resource people and materials for use in their classrooms.

Promoting the Program

Publicizing any program is a key to generating interest and participation. A monthly newsletter goes out to local



PHOTO COURTESY SARASOTA COUNTY EXTENSION OFFICE

Student participates in a field trip at Sarasota County's South Lido Park.

families promoting upcoming classes. Local media contacts (newspaper and television) promote educational events available to youth and adults. An e-mail mailing list is used to send classroom selections and announcements to families, private and public organizations, and government officials. Speaking engagements promote educational opportunities and finally, flyers are posted around the community.

Demand for Program Is Growing

Since the development of the Sarasota County 4-H environmental education programs, Keith has experienced an increase in the demand for the programs. He added, "The demand for our services are increasing for a couple of reasons. Most of our educational services are free and during a time when local communities are looking at county and state budget cuts; we are seen as a solid 'bargain' for an educational resource. The media is paying more attention to sustainability issues and this encourages more administrators, teachers, and citizens to gain more knowledge about what is 'in the news.' Water related issues are a real

life concern to families and community leaders as we face persistent droughts and decreasing water quality. And last, home school groups are becoming more organized and focused on the need for solid science curriculum, including water quality topics."

Keith is enthusiastic and knowledgeable about water education. He was eager to share his approach to teaching stormwater education and has developed a variety of environmental education programs utilizing materials from the water management districts and other sources.

Florida 4-H has a variety of environmental education curricula including, "Earth Connections," "Soil, Water, and Land Use: Understanding Pesticide Interactions" and "Soil, Water and Land Use: Understanding Nitrogen Interactions," and others. Contact your county 4-H extension agent to partner with, or learn about what they



Keith Wilson helps students explore marine life at South Lido Park in Sarasota County.

can offer. Contact Keith at: 941.861.9818 or kwilson@scgov.net.

PHOTO COURTESY SARASOTA COUNTY EXTENSION OFFICE

Funding & Awards

ING Unsung Heroes®

Do you know a teacher with a class project that is short on funding but long on potential?

Each year, 100 educators are selected to receive \$2,000 to help fund their innovative class projects. Three of those are chosen to receive the top awards of an additional \$5,000, \$10,000 and \$25,000.

Applications for the 2009 awards are now available. The application deadline is **April 30, 2009**. For more information visit <http://www.ing-usa.com/us/aboutING/CorporateCitizenship/Education/INGUnsungHeroes/index.htm>.

2009 Volvo Adventure Awards

In collaboration with the United Nations Environmental Programme (UNEP), the Volvo Adventure Award rewards young people creating their own environmental projects. There are two competitions for the 2009 awards. The Adventure Award is for youth, ages 13–16, working in groups of two to five, that are actively involved in devising and managing the project. The second competition

is the Great Big Bob the Bunny Cartoon contest for youth under the age of 13, to create a cartoon picture using Bob the bunny.

Deadline is **January 31, 2009**. Visit <http://eelink.net/cgi-bin/ee-link/newclick/8397453> for more information.

Captain Planet Foundation Grants

Next deadline is **December 31, 2008** and awards range from \$250–\$2,500. All projects must:

- Promote understanding of environmental issues
- Focus on hands-on involvement
- Involve children and young adults 6–18 (elementary through high school)
- Promote interaction and cooperation within the group
- Help young people develop planning and problem solving skills
- Include adult supervision
- Commit to follow-up communication with the Foundation (specific requirements are explained once the grant has been awarded)

Visit www.captainplanetfdn.org/grants.html for more information.

Raindrops of Wisdom

Tips to a Successful Stormwater Educational Outreach Program in Traditional Classrooms

by Katie Kulbaba, Public Awareness Specialist
City of Orlando Streets and Stormwater Division

The City of Orlando celebrates its outreach and education successes in the 2007–08 school year, having educated nearly 5,000 Orange County students and 500 teachers and staff. In light of this tremendous year, we'd like to share some tips for a successful stormwater education and outreach program, featuring some of the things we've learned along the way. You'll find that many of these ideas can be applied to other educational outreach programs for students.

1. Use what you've got. Then, fill in the blanks.

Survey your supplies and literature. What resources do you have now that are appropriate for children, or can be packaged in such a way that an entire program can be built? In our closets, we had a wealth of goodies, including an *Enviroscape* (a plastic, 3-D tabletop watershed model), and a wonderful children's book entitled *All the Way to the Ocean* by Joel Harper, as well as an older, but relevant children's activity sheets called *City of Orlando Lake Fun Facts* and *Lake Friendship Bracelets*.

Look to other stormwater educators and municipalities for help and ideas, as well as other science outreach programs, like local science and nature centers. Review the materials available in the Florida Stormwater Education Taskforce Toolkit located at: www.stormwater.ucf.edu/toolkit/

Pull the materials together and see what you have. Do you have a lot for a high school audience, but nothing for younger learners, or vice versa? Fill in the blanks to suit your mission, goals, and desired outcome.

2. Mingle with your local teachers.

Locate and meet teachers, administrators, and PTA members in your community. Develop programs that reflect Sunshine State Standards, FCAT tested areas, and subjects determined



The City of Orlando used this child's illustration on a postcard promoting their education programs.

by teachers to be difficult to teach or demonstrate. Go to the Florida Department of Education website for information: www.fldoe.org/bii/curriculum/sss and <http://fcad.fldoe.org>. You may be surprised how well your focus area ties in with teacher and student needs. For instance, in Orange County, the most "missed" subject on the 2007 science FCAT was erosion.

Market your programs at teacher events, including pre-school year conferences and midyear workshops or in-service days. Connect with administrators who can send emails

to mass lists of teachers with your announcements.

3. Tailor your programming.

Coordinate with the science (or science lab) teachers and science curriculum specialists at local schools. Some schools have one science teacher for all grade levels in the school. Tailor the programs to the audience with whom you'll be working. In our case, we found that we had supplies for one program for grades Pre-K through 2, and another set for Grades 3 and above. The older grades could use the same materials, with a different level of discussion.

Find out the teachers' tentative school year schedule. If ongoing school programming is difficult to arrange at your office, consider offering your stormwater programs at times when other water-themed lessons will be taught at the school. Subjects with great tie-ins include the water cycle, pollution and environmental protection, weather and climate, water science, and states of matter (i.e., solid, liquid, gas).

4. Think like a school teacher.

Create programs that use an entire class period, and stay within that time frame. Consider offering programs to audiences the size of one class (under 35) to encourage participation.

Make set-up simple and programming portable. You may have to move from one class to another over a short period of time. Our set up is less than 40 pounds, and we use a folding hand truck to make loading and unloading vehicles fast and easy. Make programs adaptable to a variety of locations, indoor and outdoor, large space or small.

Use inexpensive materials that can be reused or bought in local stores. The *Enviroscape* is an investment that can be used for thousands of students, and can be purchased online at www.envirosapes.com. We stock and bring two large bins with all the consumable materials we need, including literature, plastic beads, pipe cleaners, etc. You can get a giant payoff from little initial expense.

Make your programming available during the school day, and set a specific date, time, and location. Confirm

a few days in advance. Then, arrive early. Be flexible and anticipate changes in schedules, locations, and contact personnel (substitutes, etc.).

5. Survey your audience. Don't start spouting!

Find out what your students know first, and relate your programs to their local areas and events. Mention local waterbodies, landfills, water treatment plants, and neighborhoods. Would students' homes be tied into city sewage or do they have septic systems? Has a recent environmental concern made the TV news? Students in our area are very concerned about amoebas in lakes from hearing about it in local media.

Don't talk down to the students, figuratively or literally. Kids are smart sponges. If possible, get on their level. Sit if they're sitting (make sure they can still see you), or sit on the floor "criss-cross applesauce."

6. Encourage participation.

If possible, safely demonstrate the effects of pollution. With the *Enviroscape*, students use food items to represent common pollutants (i.e., parsley flakes for grass clippings and soy sauce for automotive oil), and end the program by "raining" on the model with spray water bottles. Allow students to share some examples. However, in order to stay on track, encourage questions instead. Remind students that "questions end in a question mark."

7. Make it fun!

Use humor and real life experiences when discussing pollution. Use catchy repetition and rhyme: "Only rain down the drain" and "Haste makes waste" are popular repeat-after-me phrases. Don't bore students with excessive technology. Students would much rather play a game or hear an interesting story than watch you deliver a slideshow presentation. Give a take home item to students (a pencil, ruler, activity book, etc.), however small.

Wear your enthusiasm for stormwater pollution prevention! Let students know the importance of keeping the environment healthy, but give students every

continued on page 7



Project WET and Stormwater Education

If you are a Project WET facilitator, here is a list of activities related to stormwater education. If you are not a facilitator, contact the education coordinator for your water management district and become a facilitator. Providing professional development for teachers reaches both teachers and students. Need ideas or assistance with providing a workshop for teachers? Contact Elise Cassie, elise@editype.com or 352.495.9646.

Upper Elementary, grades 3–5

- **Branching Out** (p. 129) Construct a Watershed Model
- **Incredible Journey** (p. 161) Game of movement of water through the water cycle
- **Rainy-Day Hike** (p. 186) Explore the school yard and it's effect on the watershed
- **Capture, Store, Release** (p.133) Wetlands contribution to the watershed
- **A-maze-ing Water** (p. 219) Negotiate a maze to investigate non-point pollution and stormwater
- **Sum of the Parts** (p. 267) Demonstrate how everyone contributes a little to nonpoint source pollution on a river



This spinner was developed by SJRWMD for use with the "Incredible Journey" activity, and is available online at www.sjrwmd.com.

Middle School & High School grades 6–12

- **Color Me a Watershed** (p. 223) Analyze maps to recognize how population growth caused changes in watershed and stormwater runoff
- **Sum of the Parts** (see grades 3–5)
- **Macroinvertebrate Mayhem** (p. 332) Show how macroinvertebrate populations indicate water quality using a game of tag)
- **Reaching Your Limits** (p. 344) Limbo to learn basic water quality concepts
- **Poison Pump** (p. 93) Solve a mystery re: water quality and human health
- **Get the Ground Water Picture** (p. 136) Create an "earth window" to investigate ground water systems
- **Pucker Effect** (p. 338) Simulate ground water testing to discover the source of contamination
- **Grave Mistake** (p. 311) Analyze data to solve a ground water mystery

(Provided by Washington Project WET Program)

It's All About LIFE

from page 1

Neighborhoods (FYN) principles. Teachers also spent a day training on the Healthy Water, Healthy People curriculum, with assistance from a professor from Chipola College. This initial work establishes a foundation for a future LIFE Program site in the Choctawhatchee Bay watershed.

Summer Research for Teachers

This past summer, the DEP hosted 24 teachers for hands-on research projects as part of the Panhandle Area Education Consortium's (PAEC) Science, Collaboration: Immersion, Inquiry Innovation (Sc:iii) project. With grant funding from the Florida Department of Education, the Sc:iii project allowed a total of 120 science teachers in the Panhandle an opportunity to conduct hands-on research and monitoring alongside scientists, resource managers, and environmental specialists in the field which immersed them directly into ongoing research. Three of these teachers—

assigned to DEP's Office of Environmental Education—developed a water quality monitoring program for the Wakulla Springs Springshed. They visited sites along the springshed such as Munson Slough, where most of Tallahassee's stormwater resides before making its way to the Wakulla Spring, and learned from experts from the Florida Geological Survey, DEP, and the City of Tallahassee. The water monitoring program will be integrated into the existing LIFE program for seventh graders at Riversprings Middle School starting this school year. For more information on the PAEC's Sc:iii project, visit www.paec-sc-iii.org.

LIFE in Pasco County

The newest LIFE site is also Florida's newest state park. The Werner-Boyce Salt Springs State Park located in Port Richey will serve as the backdrop for learning about water related issues for students from Chasco Middle School in Pasco County. One of the main issues this park faces is stormwater runoff from surrounding commercial establishments. Through continued funding through the DEP Springs Initiative, students will participate in field labs related to springs, water quality, groundwater, karst topography, and hydrogeology. This particular program is unique in that the teachers are part of a multidisciplinary teaching "pod" and will continue to stay with the same group of students for

three years. The program will involve water quality testing and monitoring at different points within the springshed, including stormwater ditches. A goal of this program is to increase the awareness and stewardship of spring protection through service learning. Students will learn about the cumulative impacts of their actions in addition to their neighbor's that affect the environment. Students plan to share what they learn through outreach events such as World Water Monitoring Day.

In the drive to make science education more locally relevant and meaningful, the need to find real world opportunities that challenge and engage students in rigorous and service-oriented experiences is critical. Watershed-based programs that connect the formal education system with nonformal educational experiences in the community provide a clear partnership that benefits students, teachers, and their environment.

For more information about the LIFE program, visit www.dep.state.fl.us/secretary/ed/.



PHOTO COURTESY OFFICE OF EE, FIDEP

Training at Werner-Boyce Salt Springs State Park with Pasco County teachers.



PHOTO COURTESY OFFICE OF EE, FIDEP

Okaloosa County teachers participate in the curriculum integration workshop.

Tips to a Successful Stormwater Educational Outreach Program in Traditional Classrooms

from page 5

reason to be optimistic. The future truly is in their hands.

8. Final thoughts

Give students the opportunity to take action. Organize a schoolyard cleanup or stormdrain sign installation project with their teachers.

Request feedback from students and teachers immediately, and be willing to change—*midstream* if necessary.

Give yourself down time to catch your breath between programs. Don't overlook your week.

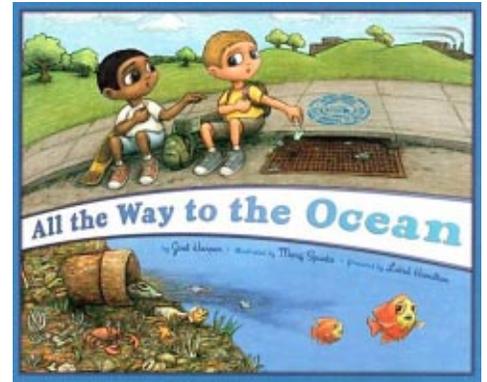
Remember that stormwater pollution prevention may be a new topic for both students and teachers. Proceed slowly. Don't get frustrated. You'd

be amazed how much students will get out of what you are saying.

Don't underestimate the value of educating children about stormwater. Remember that children are a direct link to adults at home and in their neighborhood.

Share with others. If you have a program that works, let others know about it! Here are the descriptions of the City of Orlando's two most popular stormwater education programs. We hope they'll give you inspiration!

EnviroScape is an interactive, hands-on educational and communication tool that is effective with all ages. This three-dimensional watershed model illustrates possible sources of water pollution including residential, recreational, agricultural, industrial, and transportation areas. With an entertaining series of demonstrations, participants learn how their actions affect the water in a typical community. Suggested audience: Grade 3 through Adult. Duration: 20 to 50 minutes.



All the Way to the Ocean by Joel Harper: Storybook reading and lake friendship bracelet crafts teach children how human actions link directly back to nature, with specific emphasis on stormwater pollution and lake ecosystems. Suggested audience: Pre-kindergarten through Grade 2. Duration: 20 to 50 minutes.

Please ask questions or give us your feedback at 407.246.2125, ext. 17, or email katie.kulbaba@cityoforlando.net.

At a Glance...

Southeast Watershed Forum Community Resource Mapper

This free, user-friendly, online mapping service can be used by communities to integrate natural resource protection into their land use planning efforts. Create maps at a county, watershed or state level, that compare impaired streams, impervious surface, protected lands, wetlands, State Wildlife Action Plans and much more. The *Guide to the Southeast Aquatic Habitat Plan* is a long-term, regional plan to restore and conserve aquatic habitats in the 14 states of the southeastern U.S. www.southeastwaterforum.org/.

The Southeast Watershed Forum is also a partner in the website **Southeast Watershed Assistance Network: A Clearinghouse for Land and Water Protection Resources**. As the title states, this website offers a variety of resources on all things related to land and water protection: land and re-

source conservation, watershed and stormwater managements, community training, and more. Find out more at www.watershed-assistance.net/.

Center for Watershed Protection—Post-Construction Manual

The Center for Watershed Protection has developed a new manual called "Managing Stormwater in Your Community: A Guide for Building an Effective Post-Construction Program." This manual was developed to assist Phase II communities in developing and building effective post-construction stormwater programs. The manual outlines the major elements of a post-construction program, including the relationship between local land-use decisions and stormwater management. It also covers critical elements such as developing an ordinance and design criteria, implementing a plan review process, establishing a maintenance program, and tracking and evaluating the program.

There are also eight related tools, including a self-assessment, model ordinance, manual builder, and more. You can download the manual and tools at www.cwp.org/Resource_Library/Controlling_Runoff_and_Discharges/sm.htm.

The Center for Watershed Protection also has a quarterly e-newsletter, *Runoff Rundown*. To subscribe and learn about new Center research and resources visit www.cwp.org/.

Watershed Funding

Committed watershed organizations and state and local governments need adequate resources to achieve the goals of the Clean Water Act and improve our nation's water quality. To support these efforts, the U.S. Environmental Protection Agency (EPA) has created this Web site to provide tools, databases, and information about sources of funding to practitioners and funders that serve to protect watersheds. Visit www.epa.gov/owow/funding.html for more information.

Upcoming Events

Earth Science Week Celebrates "No Child Left Inside"

Date: October 12–18, 2008

American Geological Institute is pleased to announce the theme of Earth Science Week 2008: "No Child Left Inside." Earth Science Week 2008 will encourage young people to learn about the geosciences by getting away from the television, off the computer, and out of doors.

Learn more about how to get involved in Earth Science Week 2008 by visiting the website: <http://eelink.net/cgi-bin/ee-link/newclick/8397479>.

Does your organization have an upcoming stormwater-related event? Send announcements to elise@editype.com.

World Water Monitoring Day

Dates: September 18–October 18, 2008

Coordinated by the Water Environment Federation and the International Water Association, World Water Monitoring Day boosts awareness of water quality issues by getting community groups out to local waterbodies between September 18 and October 18 each year to test the water quality in their area. Groups use a simple monitoring kit made special for WWMD and then report their results online into a global database.

Event organizers hope to build public awareness and involvement to protect the world's water resources. To learn how you can get involved in this global effort, visit: <http://eelink.net/cgi-bin/ee-link/newclick/8397469>.

Stormwater Management Academy

"Managed stormwater is good water."



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Stormwater Management Academy

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