COASTAL SERVICES

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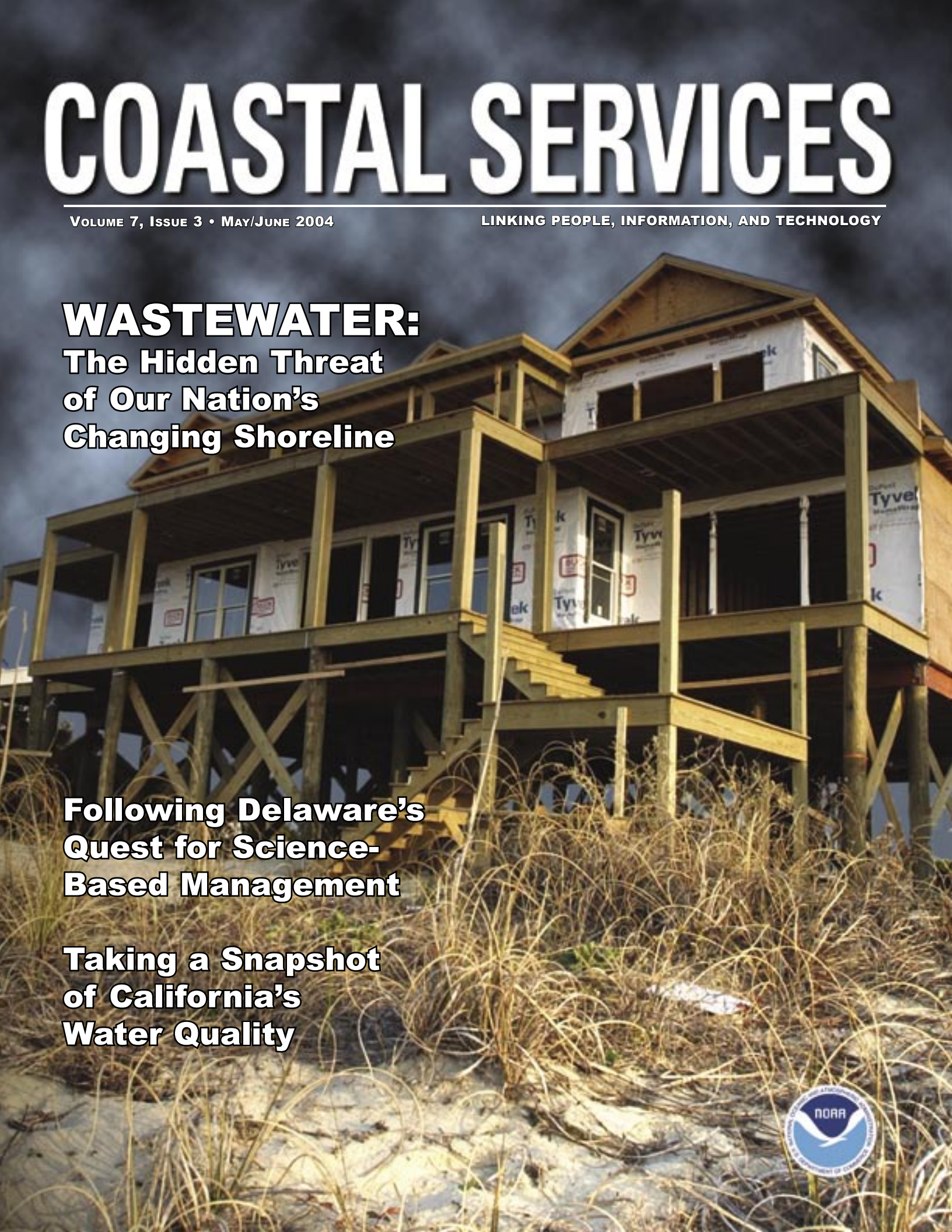
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY



WASTEWATER:
The Hidden Threat of Our Nation's Changing Shoreline

Following Delaware's Quest for Science-Based Management

Taking a Snapshot of California's Water Quality

From the Director

Beach houses aren't what they used to be. There are a number of places along our nation's coast where the modest cottages I remember from my youth have been replaced by luxurious homes that often can only be described as mansions.

Common amenities in these new homes include numerous bathrooms, dishwashers, icemakers, garbage disposals, washing machines, and lush landscaping complete with sprinkler systems.

But what happens when all this water goes down the drain? Coastal resource managers in South Carolina are finding out that many homeowners don't know the answer to this question. If the answer is that it goes into a septic system, then there could be a problem.

Overloaded and unmaintained septic systems can threaten the quality of our coastal waters and, in the worst cases, can make people ill if they drink, swim in, or play in water contaminated with harmful bacteria.

The cover story of this edition of *Coastal Services* looks at how South Carolina coastal resource managers at the state and local level are proactively addressing this hidden threat.

Water quality is a common theme running through several articles in this edition. You can read how California is taking an annual "snapshot" of the rivers and streams flowing along the state's entire coastline. Last year's Snapshot Day was the largest simultaneous water quality monitoring effort ever to occur in California.

You also will find information on how Wisconsin and California coastal resource managers partnered to bring water quality information to Latino and other traditionally underserved communities.

This edition is rounded out with an article on how Delaware's eight-year quest for science-based management is beginning to pay off for that state's coastal resource managers.

All of these examples of successful management approaches and programs are provided to help keep you informed about what other coastal managers are doing across the country.

Please let us know if you have a successful project or program that you would like to share with your fellow coastal managers.

Margaret A. Davidson

The mission of the NOAA Coastal Services Center is to support the environmental, social, and economic well being of the coast by linking people, information, and technology.

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Cover photo by Frank Micalizzi

News and Notes:

A New Hazards Outreach Tool Developed for Florida

Coastal governments must prepare for hazardous weather. But isn't this task equally important for individual community members?

Most coastal governments have emergency management departments that prepare communities for natural and man-made hazards. The National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center works with these emergency managers to identify risks and find ways to lessen the impacts of coastal storms and other hazards (see *www.csc.noaa.gov/vata/*).

A more challenging task is getting community members to make their own storm preparations. To address this issue, the Center partnered with emergency management offices in Florida's Brevard and Volusia Counties. They wanted to give citizens access to the same hazards-related information the professionals use so that families might become better informed and more prone to take action.

The team created a coastal hazards Web site located at *www.csc.noaa.gov/rvat/*. Visitors to the site can click on the "Hazards Locator Tool" link on the home page, enter an address in Brevard or Volusia County, and then watch as an on-line map zooms to that location and ranks its potential risk to four coastal hazards common to eastern Florida—storm surge, flooding, high winds, and erosion. This personalized information may entice the public to use the site and, once there, to take the information provided more seriously.

People can also use the site to find out how to protect themselves and their property from coastal storms. The site provides descriptions of different weather hazards, safety precautions people can take to prepare for them, and links to Web sites for more information. A link to the National Weather Service office allows users to check for current threats.

The Center recently unveiled the site to the project partners, and the response is enthusiastic. A brochure has been developed to promote the site, and emergency managers are sending this information to their constituents and using the promotional material whenever they interact with the public.

"This Web site is an important part of a national initiative to help coastal communities protect themselves from storms," says Russell Jackson, project lead from the NOAA Coastal Services Center. "We've found that the more site-specific we can make the data search, the more interest and action we get from the public. We hope they will use this information and join their community leaders as they try to protect themselves from coastal storms." ❖

Creating a Hazards Outreach Tool for Your Community

Most coastal programs with minimal geographic information system (GIS) experience can create a Web site that will allow community members to easily determine their coastal hazards vulnerabilities. Please visit *www.csc.noaa.gov/rvat/* and click on the hazards locator tool to see an example, or contact Russell Jackson at *Russell.Jackson@noaa.gov* should you have questions.

To create a site like this, you will need the following:

- **Spatial data layers—base maps, hazard layers, etc.**
- **List of potential partners and stakeholders**
- **Mitigation plan or the beginnings of one**
- **Hazards and information about them (i.e., coastal erosion studies, storm surge zones)**
- **GIS software**

Delaware's Quest for Science-Based Management

The Holy Grail for coastal resource managers might be the ability to base all management decisions on sound, indisputable science. Changing political climates and priorities, fluctuating funds, and the time necessary for thorough research when decisions have to be made today are some of the obstacles managers face on this difficult quest.

For the past eight years, Delaware coastal resource managers have doggedly pursued the science necessary to manage migratory shorebirds and horseshoe crabs. Although managers there say more data are still needed, their research and monitoring efforts have already proven valuable in the decision-making process.

"The science is being done, and all of this time and effort on the part of so many people is starting to pay off for management," says David Carter, environmental program manager for the Delaware Coastal Programs.

Delaware managers are using the information to guide beach nourishment projects, regulate the siting of a marina, and identify ecologically important land appropriate for the state's acquisition.

Miles to Go

The data that Delaware managers are collecting document the arrival of hundreds of thousands of migratory shorebirds each spring upon the beaches of Delaware Bay.

"We didn't have data or information to confirm or refute any of their concerns."
David Carter, Delaware Coastal Programs

As they make their journey of up to 9,000 miles from South America to the Arctic, shorebirds such as the red knot, ruddy turnstone, sanderling, and semipalmated sandpiper stop at the bay to rest and feed on horseshoe crab eggs. If the shorebirds aren't able to eat enough at this rest stop, they may not have enough fat reserves to survive.

While the migratory birds depend on the bay's habitat and the abundance of horseshoe crabs, they are not the only ones calling dibs on the area's beaches and crab population.

Fishermen sell the horseshoe crabs for use as bait, the biomedical industry depends on horseshoe crab blood to test pharmaceutical products, and recreational birders and ecotourists create disturbances, which can have profound negative impacts on shorebirds.

Unanswered Questions

In 1996, the Delaware Chapter of the Sierra Club and other environmental groups "put a spoke in the wheels" of a beach replenishment project when they challenged a state permit, citing concerns about potential toxins and the project's impacts on the horseshoe crabs and shorebirds.

"We got caught off guard," recalls Carter. "We didn't have data or information to confirm or refute any of their concerns."

With contention growing among user groups, the state was being asked to make "difficult decisions without knowing about the stock of horseshoe crabs, or understanding what was going on with the migratory bird population. We needed to get sound management information and find some common ground on the issue. We knew we needed to start with science," Carter says.

Finding the Answers

Initial investigations were able to answer some of the environmental groups' concerns, but this work brought to light serious data gaps.

Sampling easily showed that the beach sediments were clean, but there was no precise census of the total numbers of shorebirds passing through Delaware Bay during the spring migration, and historical data on horseshoe crabs were limited.

To fill in the gaps, a coalition of professional scientists and volunteers from the U.S., United Kingdom, and the Netherlands was cobbled together to form the Delaware Shorebird Monitoring Team.

Over the past six years, the Delaware Shorebird Monitoring Team has captured and collected data on more than 10,000 birds. Detailed records have been kept on bird populations, horseshoe crab egg abundance on the beaches, and the location and preferred types of habitats.

"The whole project is very labor intensive," notes Kim Cole, environmental scientist for the Delaware Coastal Programs. "It takes lots of volunteers, who have to be well trained and devoted."

To ensure that the best quality data are being gathered by the team, the U.S. Fish and Wildlife Service recently completed a scientific peer review of existing shorebird data.

Deciding Factors

What the researchers have discovered so far is that good horseshoe crab spawning beaches, and thus good shorebird habitat, include characteristics such as coarse beach sand, moderate to steep slope, protection from the wind, and a shallow nearshore bay bottom.

This information, says Stewart Michels, fisheries scientist in the Delaware Department of Natural Resources and Environmental Control's Division of Fish and Wildlife, led managers to look at the effect beach replenishment had on horseshoe crabs, and "devise a way to optimize the grain size of sediments to create better habitat."

"This is the type of research that we need to actively manage beach replenishment" and, ultimately, horseshoe crab populations, Michels says.

The data also proved vital when a property owner proposed putting a 42-slip marina in an area where research showed 60 to 70 percent of red knots take their migratory break. To protect the birds, the marina was reduced to eight slips.

"We didn't want to hinder the property owner from some use of his property, and we know the birds will adjust somewhat to some disturbance. By reducing the number of slips, we significantly improved and protected the condition for the birds," Carter says.

Because the data have helped identify key habitat sites, several agencies are currently working to help guide the state's acquisition of these lands.

Time Will Tell

Using the data to make these types of decisions, Carter says, is the reward for relentlessly pushing the need for research and monitoring. He believes it will take many more years, however, before the data will solidly be the basis for managing the resources.

"It will take 20 years to establish long-term trends with a reasonable level of confidence," Carter says. "We still have much to learn to effectively manage these species."

Carter acknowledges that changing political winds, lack of funds, and other obstacles can make long-term research and monitoring difficult for coastal managers, but he believes the quest for science-based management is important.

"Improving our understanding with long-term data is critical," he says. "With each passing year, we will be provided with better science to guide our management efforts." ❖

For more information on the Delaware Shorebird Monitoring Team, point your browser to http://shorebirds.skalizar.net. You also may contact Kimberly Cole at (302) 739-3451, or kimberly.cole@state.de.us. You may contact David Carter at the same number, or e-mail david.carter@state.de.us.

Photos courtesy of Delaware Coastal Programs

Members of the Delaware Shorebird Monitoring Team prepare a net that will be shot across the beach to capture birds for monitoring and banding. (Above, left) A member of the team surveys the beach for birds.

Wastewater:

The Hidden Threat of Our Nation's Changing Shoreline

Runoff from overloaded septic systems can contaminate drinking water wells, estuarine waters, and edible shellfish.

Much of the nation's shoreline is changing. Small beach cottages are being replaced with what some call "megamansions." More people can stay in these plusher homes, which usually feature now-common amenities, such as dishwashers, icemakers, and sprinkler systems. While homeowners typically give much thought to the design and comfort level of these new homes, the water going down their drains can be out of sight, out of mind.

This forgotten wastewater often is flowing to the same septic system that served the older, much more modest cottage. If an overloaded septic system malfunctions, there is a potential hazard that harmful bacteria in the runoff could contaminate drinking water wells, estuarine water, and edible shellfish.

If this happens, residents who drink the infected water, swim or play in the estuary, or eat the tainted shellfish could become ill and never suspect the cause.

It is fears of this hidden threat that have spurred South Carolina coastal resource managers at the state and local level to proactively plug regulatory loopholes dealing with septic systems and act to educate those who work, live, and play along the shore.

Watching the Clothes Go Round

"Our belief is that a well-designed septic system is a very efficient way of treating effluent," says Joe Mole, chair of the Town of Edisto Beach Planning Commission. "The problem is that if it's not well designed or well managed, you can have a problem and not know it until late in the game."

Most residential septic systems consist of a buried 1,000-gallon tank and a drain field. As wastewater from showers, toilets, washing machines, dishwashers, and sinks flows into the tank, the heavier solids settle to the bottom and the lighter solids, greases, and oils float to the top. The liquid wastewater, or effluent, flows into the drain field where it is treated as it percolates through the soil to the groundwater.

"The intent was not to restrict the number of bedrooms, but to relate the size of the septic system to the uses of the house."

Linda Woods,
Town of Edisto Beach

There are a number of reasons septic systems can fail, says Lisa Hajjar, soil scientist with the Coastal Nonpoint Source Management Program in South Carolina's Department of Health and Environmental Control's (DHEC) Office of Ocean and Coastal Resource Management.

If more wastewater than the system can handle is pushed through the tank, or the tank is not pumped regularly, the sludge may spill out into the drain field, eventually causing the septic system to fail. Too much surface water near the drain field, say from a sprinkler or irrigation system, or unsuitable soils can also keep the ground from adequately cleansing the wastewater.

Finding the Loopholes

South Carolina regulates septic systems by requiring that DHEC issue a permit before construction can begin on a new home that will use a septic system. The size and type of the permitted septic system is based on the planned number of bedrooms. Estimating two people per bedroom determines how many gallons of water the septic tank must be able to handle on average, Hajjar explains.

Local governments, however, have discovered some problematic loopholes in the state requirements.

For instance, building plans are increasingly featuring rooms, such as libraries or dens, that do not count in DHEC's calculations determining the septic system's size. These rooms often can and are used as bedrooms, which is particularly an issue in homes used as vacation rentals. Such a house might be built with three bedrooms, but might later be advertised as sleeping 20.

Another regulatory gap is the remodeling of a home. The current state regulations allow the property owner to use the existing septic system with no review, even if there is a significant increase in the size of the home and the number of people who can stay there.

Taking It into the Bedroom

Many local governments are stepping in to fill these regulatory gaps. The Town of Edisto Beach on one of South Carolina's barrier islands is addressing septic systems and other nonpoint source pollution by limiting square footage of new and remodeled homes, establishing a minimum lot size, and even defining the word "bedroom."

While regular water quality monitoring shows no signs of a problem with septic systems on Edisto, Joe Mole explains that the community is proactively addressing the issue because "we were warned by DHEC that we had a potential problem" on an area of the beach where the soil was so sandy, the effluent might not be adequately filtered.

"The state couldn't take action unless there was a major spill or contamination, and we wanted to cut it off before it got that far," Mole says.

The town now requires a new DHEC septic system permit if reconstruction or improvements to a house results in an increase in square footage. An ordinance was passed prohibiting homeowners from paving over drain fields or septic tanks, and there is now a minimum lot size.

One of Edisto's more interesting approaches has been to define the word "bedroom."

"We went on the Internet and gathered ordinances from all over the country," says Linda Woods, administrator for the Town of Edisto Beach. "The intent was not to restrict the number of bedrooms, but to relate the size of the septic system to the uses of the house."

Linda Peeples, Edisto's building codes administrator, notes the town has also started a voluntary maintenance program for homeowners. "We're trying to convince people that it's in their best interest to have their system inspected on a regular basis because repair costs will be considerably higher than just taking care of their system in the first place."

To address storm water runoff in general, the town has put limits on the overall square footage of new construction, and the amount of impervious surface, such as driveways, that can be put around new homes.

If They Only Knew

To help bridge the gap between the limitations of the state's regulatory authority over septic systems and the federal 6217 statute requiring states to address coastal nonpoint source pollution, South Carolina's coastal program is working to educate homeowners and related professionals about septic systems, and to assist local governments in their efforts to regulate them.

The coastal program's efforts include conducting a survey of stakeholders in coastal counties, such as staff of local governments,

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Photos courtesy of South Carolina Department of Health and Environmental Control

Taking a Snapshot of California's Water Quality

Last year's Snapshot Day on May 17 was the largest simultaneous water quality monitoring effort ever to occur in California.

Take 679 volunteers and simultaneously send them to 575 sites along California's coastline to test water quality, and you have a snapshot of the health of the rivers and streams flowing into the state's coastal waters on that day. Do this one-day guerrilla monitoring every year and trends begin to emerge that can help coastal resource managers make decisions to protect and improve coastal waters.

For the fifth year in a row, Monterey Bay National Marine Sanctuary is helping to lead such a massive monitoring effort. Last year's Snapshot Day on May 17, the first to include the whole state, was the largest simultaneous water quality monitoring effort ever to occur in California.

"It's a lot of work, but it's doable," says Bridget Hoover, coordinator of the Monterey Bay Sanctuary Citizen Monitoring Network. "In the face of state and local budget cuts, these citizen efforts and our support of them are becoming increasingly important."

Snapshot Day data have been used to support grant proposals, target restoration projects, and encourage collaboration among the state's numerous monitoring programs.

Finding Sanctuary

Snapshot Day began in May 2000 as a sanctuary-wide event. Each May since then, the sanctuary has partnered with the Citizen Watershed Monitoring Network, Coastal Watershed Council, California Coastal Commission, and the Ocean Conservancy to do the one-day monitoring event along the 276 miles of coastline within the sanctuary's borders.

Originally designed to raise public awareness about water quality issues in the sanctuary, the collected data also became a valuable management tool, says Rachel Saunders, community and public relations coordinator at the Monterey Bay National Marine Sanctuary.

During that first year, 120 volunteers took field measurements of temperature, dissolved oxygen, pH, and conductivity, and collected water samples for laboratory analysis of nutrients and bacteria levels. The results showed overall water quality in many of the sanctuary's watersheds to be very good. The data, however, did indicate some problem areas.

High levels of (*Escherichia*) coliform bacteria, indicating waters unsafe for contact, were found at 18 sampling sites, and high levels of nitrates or phosphates, which can have negative impacts on aquatic life, were found at 16 sites.

Snapshot Day is the only time the majority of sites are ever monitored.

"While this was a great outreach tool, people were more interested in the actual data," Saunders says. "Each year since then we have enhanced the quality of data by developing really good protocols and quality assurance."

Quality and Quantity

All volunteers who participate in Snapshot Day go through a training program to familiarize them with monitoring protocols, sampling equipment, data sheets, and safety measures. At the trainings, the equipment that will be used is calibrated so the data can be accurately compared.

The standardized protocols used by the volunteers were defined in the Snapshot Day Quality Assurance Project Plan and Monitoring Plan, which was developed by the coordination team of Hoover, Ross Clark of the California Coastal Commission, and Tamara Doan of the Coastal Watershed Council.

The 2003 event was modeled after the process the team developed for the first three Snapshot Days. This model includes gathering volunteers into "hubs" throughout the sanctuary, where coordinators go over last-minute details and distribute equipment.

Not only does this make logistics easier, Hoover says, but it "makes the volunteers feel more involved and helps them see the big picture when they come together as a group."

The volunteers form teams that fill out the data sheets and enter the data into a centralized database. The data are analyzed and verified before a report is produced. "It's always my goal to have the previous year's report out before the next event," Hoover says.

Photos and graphic courtesy of Monterey Bay National Marine Sanctuary

Water quality was tested at 575 sites during last year's Snapshot Day.

"That's one of the downfalls—how long it takes to get the information out."

Branching Out

Last year the Monterey Bay Sanctuary Foundation received funding from the State Water Resources Control Board and the U.S. Environmental Protection Agency (EPA) to expand the program to include the entire California coastline. Coordinators were hired and trained to manage the event in each of eight regions.

While coordinators were responsible for finding, organizing, and training the volunteers for their area, they were supported by numerous state and local agencies, as well as 69 individual watershed and citizen monitoring groups that participated in the event.

As a result, almost 700 volunteers sampled creeks, streams, estuaries, rivers, bays, and the ocean from the Oregon border to Mexico, and 33 areas of concern were identified as priorities for further investigation.

Decisions, Decisions

Even with the success of last year's Snapshot Day, funding for 2004 fell short. The sanctuary-wide Snapshot Day will follow the same protocols, and volunteers who participated across the state last year will be encouraged to participate on May 1. However, coordinators were not hired, and no statewide report will be written. "It's unfortunate," Hoover says.

Saunders points out, though, that about $15,000 received from the EPA last year was used to purchase monitoring equipment, which was distributed to related nonprofit organizations to conduct year-round monitoring.

Last year's event, Hoover says, "kick started monitoring programs throughout the coast, which was really neat to be able to do."

With five years of data to build on, Saunders notes that, in addition to encouraging citizen stewardship of local waters and watersheds, Snapshot Day is providing the sanctuary with information that may help evaluate the success of restoration, cleanup, and pollution prevention measures.

Hoover adds, "You can't make good decisions with information based on one day, but you can when you're looking over the years and are seeing trends. We are now able to target our efforts in those areas to figure out what's going on." ❖

To read the coastwide Snapshot Day report, point your browser to www.coastal.ca.gov/publiced/pendx.html. For more information on Monterey Bay National Marine Sanctuary's Snapshot Day, go to http://montereybay.noaa.gov. You also may contact Bridget Hoover at (831) 883-9303, or bhoover@monitoringnetwork.org. Rachel Saunders can be contacted at (831) 647-4237, or Rachel.Saunders@noaa.gov.

Sharing "Agua Pura" with the Latino Community

Wanting your children to play on clean beaches transcends cultural and national differences. It is those differences, however, that can make it challenging for coastal resource managers to share water quality information with Latino and other minority populations.

Agua Pura, or Pure Water, is successfully engaging Latino youth in Santa Barbara, California, in water protection issues and activities. The result is a model for other resource educators to work with traditionally underserved communities.

"This is not just watershed education or environmental education; it's a means for building stewards."

Michael Marzolla, University of California Cooperative Extension

"This is not just watershed education or environmental education; it's a means for building stewards," says Michael Marzolla, 4-H youth development advisor for the University of California Cooperative Extension in Santa Barbara.

Agua Pura began in 1999 with a Watershed Education Leadership Institute, which resulted in the creation of a planning manual for working with Latino youth.

Offshoots of the institute include an after-school watershed education program, led by Latino college interns, which has graduated 560 Latino children. Watershed education is being incorporated into summer day camps for Latino children, and the local housing authority has developed a watershed education program for the children of its majority Latino tenants.

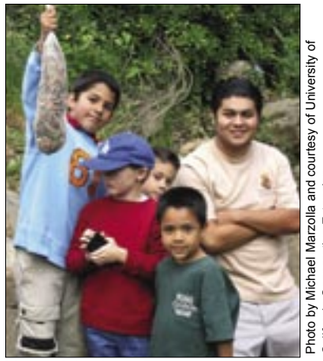

Photo by Michael Marzolla and courtesy of University of California Cooperative Extension

Many of the Agua Pura programs are aimed at Latino children.

The Agua Pura Leadership Institute brought together people who work with Latino youth on a regular basis, including teachers, Scout leaders, park rangers, museum employees, and other youth leaders, with city and county resource managers.

The three-day workshop presented information on water quality issues and provided hands-on activities, such as sampling for water quality. It covered the topics of adolescent behavior and the use of poetry and art to educate youth, and identified outreach methods and resources available to involve the Latino community in water education programs.

It also included discussions characterizing the Latino community and assessing how school curricula and activities could be modified to suit the needs of Latino youth.

The pilot institute was developed by the University of Wisconsin's Cooperative Extension Environmental Resources Center in Madison, Wisconsin, and the University of California Cooperative Extension 4-H Youth Development Program, and was funded by the U.S. Department of Agriculture.

The resulting manual could be used by environmental resource educators in other areas "to help them understand the Latino community," says Elaine Andrews, environmental education specialist for the University of Wisconsin Cooperative Extension. "It describes the process we went through and provides all the tools and resources we developed."

The keys to the process, Andrews says, were involving community leaders and listening to their advice. "If they say we need to work with families at the kitchen table, then we try to figure out a way to reach those families."

Marzolla has kept the Agua Pura program going by hiring college interns to lead after-school programs using a water quality curriculum, and developing projects with unusual partners, such as the housing authority and recreational fishermen.

"The message for the resource education community," he says, "is that you really can make a difference if you build relationships and really try to engage people. . . It takes a lot more time and concentration, but in the long run we're building effective community leadership." ❖

To view Agua Pura: A Leadership Institute Planning Manual for Latino Communities, go to www.uwex.edu/erc/apsummary.html. You also may contact Michael Marzolla at (805) 692-1730, or ammarzolla@ucdavis.edu. You may contact Elaine Andrews at (608) 262-0142.

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septic installers and pumpers, county and city engineers, public works department staff, and home inspectors. "The overall perception," Lisa Hajjar says, "is that a lot of homeowners don't even know where their septic system is, much less how to properly operate it."

As a result of the survey, the coastal program helped develop a training program for septic system inspectors, and created a South Carolina homeowner's guide and record keeping folder, which was distributed in the state's eight coastal counties. DHEC liked the guide so much, Hajjar says, it is now distributing the folder with every septic system permit issued across the state.

Hajjar works with communities to draft ordinances to help manage septic systems and will soon be working with Clemson University in South Carolina to develop a short course for real estate agents, "so they will pass the information on to homeowners."

It Beats the Alternative

Beach communities like Edisto want to keep septic systems as a long-term solution for wastewater treatment.

"Putting in a sewer system is an enormous cost and you open yourself up to higher development densities, which will change the character of these communities," Hajjar explains.

The challenge, she says, comes in making sure septic systems keep up with the development that is occurring. ❖

For more information on South Carolina septic system education efforts, contact Lisa Hajjar at (843) 747-4323, or hajjarlm@dhec.sc.gov. For more information on the Town of Edisto Beach's effort to address septic systems, contact Linda Woods or Linda Peeples at (843) 869-2505.

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