COASTAL SERVICES

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LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

THE DEAD ZONE:
The Struggle to Breathe Life into the Gulf of Mexico

GoMOOS Gets into Shallow Water in the Gulf of Maine

Living Reef at Heart of Hawaii Public Awareness Campaign

From the Director

Dead zones, or hypoxic areas where creatures that cannot swim away are smothered in oxygen-depleted estuarine and coastal waters, are developing throughout the U.S. Probably the hypoxic area that is best known is in the Gulf of Mexico, where the largest area of anthropogenic coastal hypoxic water in the world can be found.

What researchers know about the Gulf of Mexico's dead zone is that unless the nutrient load that washes into the gulf from the Mississippi River is reduced, hypoxia will appear each summer over a large area, which in the past has grown to the size of Massachusetts.

To significantly reduce the size and impact of the gulf's hypoxic area, researchers say, a nationally coordinated and wholly funded initiative is necessary. With the nation's limited fiscal resources focused on national security, however, the biggest reduction to the dead zone may result from the land-use planning, pollution prevention, coordination, and educational efforts of state and local coastal and inland resource managers.

In this edition of *Coastal Services*, we look at the issues of hypoxia in the Gulf of Mexico and the potential role for coastal resource managers.

Habitat concerns, such as hypoxic areas, will be part of the discussion at the Solutions to Coastal Disasters Conference 2005 being held May 8 through 11 in Charleston, South Carolina.

Co-sponsored by the National Oceanic and Atmospheric Administration (NOAA), presentations will cover topics ranging from hazard planning to port management, to storm response and monitoring. Special sessions will cover the South Asia tsunami and the hurricanes of 2004—Frances, Ivan, and Jeanne. To register, point your browser to *www.asce.org/conferences/cd05/*.

Also, don't forget to register for Coastal Zone 05, the premier conference for the world's coastal resource managers, being held July 17 through 21 in New Orleans, Louisiana. With over 1,000 participants expected from all over the world, this conference promises to provide valuable tools, lessons learned, and many new ideas. For more information, go to *www.csc.noaa.gov/cz/*.

Hope to see you at both of these exciting conferences!

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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News and Notes

Promoting Good Communication Skills in the Workplace

The poll wasn't very scientific, but the results were immediate and helpful.

Employees of the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center were asked for "examples of good and bad workplace communication practices." The e-mailed responses were swift, the feelings were strong, and the replies came from all sectors of the organization. It was almost as if the staff was just waiting to be asked.

Most of the comments amounted to frustration with what could be considered minor lapses of etiquette. But by making these concerns known, the Center hopes to improve communication skills and increase the general level of satisfaction in the workplace.

The following list of tips was compiled to capture the most frequently mentioned concerns and suggestions. The Center encourages other organizations to try similar experiments with their employees to see what issues they might uncover.

Voice Mail

1. **State your phone number slowly. Give your name and phone number at the beginning of the message and again at the end.** This was the most frequently mentioned item and a strong source of irritation to many.
2. **State the reason for your call, but don't ramble.** Voice mails should be short and to the point. Strive for a few sentences at most.
3. **If you are out of the office for a day or more, state this on your voice mail message.** The same is true for your e-mail account. Let people know when they can expect to hear from you.
4. **Leave the date and time of your call.** Not everyone has this automatic feature on his or her voice mail system.

E-Mail

1. **Automatically incorporate contact information into each e-mail.** Does your name, phone number, place of business, and address appear at the end of each e-mail?
2. **Use the subject line wisely, and use it each time.** For people who get lots of e-mail, "Meeting" doesn't say much. Can you put something in the subject line that distinguishes your message from others?
3. **Don't use "reply to all" unnecessarily.** Do all the e-mail recipients really need to copy everyone on the list as they say thank you or make some small comment? Does everyone really need to know when you are on vacation?
4. **Don't be overly casual.** While you might know what the electronic messaging shorthand means, does everyone? In your quest to be efficient, are your e-mails hard to understand? Several people mentioned the need for proper grammar and punctuation to make e-mail readily understandable.

Meetings

1. **Start on time, end on time.** Everyone's time is valuable. Starting and ending according to the schedule is respectful to all in attendance. Bosses should remember this rule during staff meetings, since late or long meetings seem to be a common occurrence.
2. **Don't go acronym crazy.** This is true for PowerPoint slides and the spoken word. Remember, not everyone is a member of your particular acronym club. ❖

Do you have some examples to add to the list? If so, please send them to Donna.Mccaskill@noaa.gov. These replies may be used (anonymously, of course) in a future article.

Photos by Neal Pettigrew, University of Maine, and courtesy of GoMOOS

Getting GoMOOS into Shallow Water in the Gulf of Maine

With their focus on the nearshore and estuarine environments, some coastal resource managers remain unsure of how the multitude of data collected far offshore by national and regional ocean observing systems will help them do their jobs. A national pilot program in the Gulf of Maine is working to bring usable data to all those who need it, including the region's coastal resource managers.

The Gulf of Maine Ocean Observing System, or GoMOOS, is a "user-driven organization," says Josie Quintrell, director of policy and planning at GoMOOS.

Coastal management needs will be addressed, she says, because numerous representatives from the region's coastal zone programs and National Estuarine Research Reserves are engaged in the organization's membership and serve on its board of directors. As a result, "they have a say in what we do and how we do it."

GoMOOS efforts to address coastal management needs include recently placing information-gathering buoys in nearshore waters and working to integrate related data from numerous sources, putting that data into a relevant context for coastal managers.

> **"This will be the real test of how ocean observing can be of help to coastal managers."**
>
> **Josie Quintrell, Gulf of Maine Ocean Observing System**

Those interviewed for this article agree that coastal manager involvement in GoMOOS and other regional observing systems is critical to get resource management needs on the table. There also is consensus that patience on the part of coastal managers is required because of the sheer number of potential users with differing needs, and the difficulty in harnessing rapidly developing technology.

"I think a leap of faith is needed that it will be useful to us," says Susan Snow-Cotter, director of Massachusetts Coastal Zone Management. "I am hopeful and have already seen some indirect benefits."

Measure by Measure

In 2001, GoMOOS deployed 10 buoys in the Gulf of Maine, which includes the shorelines of Massachusetts, New Hampshire, and Maine, as well as several Canadian provinces, to track information above and below the ocean surface.

Measurements at the surface include wind, waves, temperature, and fog. Below the surface, GoMOOS provides hourly measurements of currents, temperature, salinity, color, turbidity, dissolved oxygen, and more. Satellites produce images showing ocean temperature, color, and surface winds, and these images help fill the gaps between buoys.

Much of the collected data are available real-time on the GoMOOS Web site, *www.gomoos.org.* Users who tapped into this initial stage of data distribution include mariners, commercial fishermen, and recreational boaters. Harbor pilots, Quintrell points out, are using GoMOOS data to help oil tankers navigate through productive lobstering areas.

Uses of GoMOOS data, which Snow-Cotter notes have assisted coastal managers, include a buoy that allows the Massachusetts Water Resources Authority to monitor water quality upstream of the Boston sewage outfall that pumps effluent into Massachusetts Bay. This monitoring is important to protect communities along neighboring Cape Cod Bay and endangered marine mammals in the adjacent Stellwagen Bank National Marine Sanctuary.

The aquaculture industry also uses GoMOOS data for choosing aquaculture sites, monitoring ocean conditions, and evaluating the environmental impact of its activities.

Meeting Broader Needs

While these early uses of the data are important, the goal of GoMOOS, notes Quintrell, "has always been to provide a wide variety of users with data to aid in decision making, problem solving, and research efforts." To meet this goal, GoMOOS conducted a series of user needs assessments, and staff members have worked to ensure that all potential users of the data are involved in the nonprofit's membership and board of directors.

In addition to coastal managers, GoMOOS users include commercial mariners, scientists, educators, search and rescue teams, emergency response teams, and public health officials.

"What we learned from the dialogue with coastal managers is that there is a real need for dynamic, rapid data exchange," Quintrell says. "Not just getting out data on a real-time basis, but also integrating that data with other data sets into information products people can use."

For example, Snow-Cotter says, her agency would find ocean observing data coupled with seafloor mapping useful. "Anything that helps put the biological and physical data into context."

GoMOOS is working to become a clearinghouse for related data collected by other organizations that could be merged with GoMOOS data and converted into useful information, such as through modeling or predictive warning systems.

An illustration of this would be the ability to "alert managers that conditions are ripe for a harmful algal bloom," Quintrell says. "The future of ocean observing really lies in getting out the data in a predictive capacity."

This initiative to develop the Gulf of Maine Ocean Data Partnership will "hugely benefit us," says Snow-Cotter. "They are breaking down the walls on how different organizations in the region store and distribute data."

Closer to Shore

While benefits have been seen, one of the common concerns expressed about ocean observing is that the data buoys are too far offshore to meet coastal management needs.

"Many coastal resource managers are just that—coastal," says Brian Smith, research coordinator for Great Bay National Estuarine Research Reserve (NERR) in New Hampshire. "More of their issues are nearshore and estuarine oriented."

GoMOOS is taking the first steps toward pushing the "observation community into shallower water," Smith says. Inshore buoys are being placed in Casco Bay, Maine, and near an existing NERR monitoring station in Great Bay.

"This will be the real test of how ocean observing can be of help to coastal managers," says Quintrell.

Giving Voice

The focus on creating useful data and putting it into a context to meet coastal manager and other user needs has been key to GoMOOS' success thus far, says Quintrell.

"Since it's a growing and evolving system, it's important for managers to work with us to make sure it is addressing their needs," Quintrell says. "The best way for managers to get involved is to talk one-on-one with the regional observing systems in their areas and keep that dialogue going."

Snow-Cotter agrees. "I think it's critical for coastal managers to be involved and have a voice in directing these efforts. This is a NOAA [National Oceanic and Atmospheric Administration] priority. These systems provide a great deal of data, and if coastal managers are not involved, there will be a tendency for data collection to go other ways."

She adds, "It's our job to remind folks of the nearshore applications. This stretches them [ocean observing systems], and I understand they can't serve everybody's needs, but the coast and nearshore environment are where the people are, and it's the people who are paying for these buoy systems. That's an obvious connection that needs to be made." ❖

Researchers prepare to launch one of 10 GoMOOS buoys in the Gulf of Maine that track information above and below the ocean surface.

To download data from the Gulf of Maine Ocean Observing System, point your browser to www.gomoos.org. You may contact Josie Quintrell at (207) 773-0423, or josie@gomoos.org. For the coastal resource management perspective, contact Susan Snow-Cotter at (617) 626-1202, or susan.snow-cotter@state.ma.us, and Brian Smith at (603) 868-1095, or bsmith@nhfgd.org. For more information on efforts to develop plans for a nationwide coastal ocean observing system, go to www.nopp.org and www.ocean.us.

The Dead Zone

The Struggle to Breathe Life into the Gulf of Mexico

Every spring and summer, creatures that cannot swim away are smothered in oxygen-depleted water at the bottom of the northern Gulf of Mexico. Some years, this hypoxic or "dead zone" off the Louisiana-Texas coast has grown as large as the state of Massachusetts.

This hypoxic zone potentially puts at risk gulf fisheries—a $26 billion-a-year industry that provides the nation with more shrimp, oysters, and fish than anywhere outside Alaska.

In the late 90s, six teams of scientists, working together with the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, were asked to determine what causes the dead zone and what could be done about it.

The task force determined that the main cause is excess nutrients, especially nitrogen, washed into the gulf from the Mississippi River, which drains 40 percent of the lower 48 states. On October 11, 2001, federal and state officials announced an ambitious $1-billion-per-year plan to reduce the gulf hypoxic area to one-fourth its largest size by 2015.

Scientists now complain that due to lack of money and political will little of the mostly voluntary plan has been implemented.

"The task force still meets, but there is no new money to support the various activities, especially management," says Nancy Rabalais, professor at the Louisiana Universities Marine Consortium and one of the lead researchers of the gulf hypoxic zone.

To significantly reduce the size and impact of the gulf's dead zone, researchers believe that a nationally coordinated and wholly funded initiative is necessary. While the nation's priorities are elsewhere, however, the land-use planning, pollution prevention, coordination, and educational efforts of state and local coastal and inland resource managers have the potential to become even more important.

With "hypoxic areas developing in estuaries and coastal areas throughout the U.S.," Rabalais warns, addressing or preventing the development of similarly oxygen-deprived areas should be a concern for all coastal managers.

Sizing Up the Source

One of the largest rivers in the country, the Mississippi drains 31 states from Montana to New Mexico to New York, including nearly every state between the Rockies and the Appalachians. Fertilizers, sewage treatment waste water, animal waste, industrial wastes, and atmospheric pollutants all contribute nitrogen and phosphorus to the Mississippi.

Over the years, the Mississippi watershed has had millions of acres of wetlands and bottomland forests—the natural filters of nutrient-rich runoff—drained for farmland and development, or separated from the river by a huge system of levees built to contain floodwaters.

Every summer, the excess nutrients from the runoff feed an explosion of algae growth, which eventually dies and sinks. As the dead material decomposes, oxygen is depleted from bottom waters, which remain relatively undisturbed by the gulf's summertime low winds and calm seas. When hypoxia sets in, sea life can no longer survive.

While it is unknown how long hypoxia has been occurring in the gulf, studies show that the level of oxygen depletion has steadily worsened over the past two centuries, rapidly accelerating since the 1950s. The Gulf of Mexico's dead zone is now one of the largest areas of anthropogenic coastal hypoxic water in the world, says Rabalais.

"I think it's a mistake to try to separate the gulf's hypoxia from the problems of wetlands losses in the Mississippi delta and throughout the Mississippi basin," says John W. Day, distinguished professor in the Department of Oceanography and Coastal Sciences at Louisiana State University. "This needs to be looked at as a basin-wide problem with the solutions distributed throughout the Mississippi basin."

How Serious Is Serious?

What researchers know is that unless the nutrient load entering the northern gulf is reduced, hypoxia will appear each summer over large areas. There is still much that is not known about the dead zone, including all of its possible economic and ecological implications.

There is still much that is not known about the dead zone, including all of its possible economic and ecological implications.

Rabalais notes that the limited number of economic studies done show the hypoxic zone causes "no documentable economic impacts," but "that doesn't mean there are no impacts. The data needed to determine the actual impacts doesn't exist. . . What we don't know is how the overall productivity of the system has changed."

Not only do the impacts on the gulf need more study, asserts Day, but also the impacts on the entire Mississippi watershed need to be taken into account.

"The value of the Mississippi basin is hundreds of billions of dollars," Day explains. "This is the agricultural base of the U.S. The Mississippi River provides transport for more than 472 million tons of cargo each year. It's enormously important that we begin to see the relationship between good economic value and good environmental quality."

Day adds, "If we are not paying attention, in a sense, we're being a little bit foolish."

What's the Plan?

Among the actions in the plan set out by the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force were restoring wetlands and forest buffers along waterways, establishing a nitrogen-credit system with incentives for the agricultural

Continued on Page 9

To learn more about the hypoxic area in the Gulf of Mexico, point your browser to the following sites:

www.epa.gov/msbasin/
Information on the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force activities from the U.S. Environmental Protection Agency, Office of Water. Site provides an introduction to the Mississippi River basin and its relationship to the Gulf of Mexico, with links to scientific reports.

http://oceanservice.noaa.gov/products/pubs_hypox.html
Hypoxia assessment reports, comments, and integrated assessment from the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Coastal Ocean Science.

http://toxics.usgs.gov/hypoxia/
A resource for information on hypoxia in the Gulf of Mexico and related U.S. Geological Survey activities.

www.smm.org/DeadZone/top.html
The Science Museum of Minnesota's Web site on the dead zone, featuring interactive educational materials.

The Merits of Multicultural Education in Monterey Bay

The increasing diversity of the American population means there is no "one size fits all" method for educating the public about coastal resource management issues. To help reach a broader audience, coastal managers in California are working together to provide an array of multicultural programs within the Monterey Bay National Marine Sanctuary.

The effort has been so successful it is becoming a national model for multicultural education in other sanctuaries.

"Because of the changing demographics in our nation, there is an incredible need for multicultural programming."

Michelle Templeton, Monterey Bay National Marine Sanctuary

Under the Multicultural Education for Resource Issues Threatening Oceans (MERITO) program, about 25 regional groups are collaborating with the sanctuary to provide after-school and adult education classroom support, field trips, teacher training and resources, college internships, and event support, all aimed at the "diverse communities residing within the sanctuary's watersheds," says MERITO Program Manager Michelle Templeton.

"Because of the changing demographics in our nation, there is an incredible need for multicultural programming," says Templeton, who is herself binational and bilingual. She notes that in Monterey County alone, 47 percent of the people identify themselves as Latino. In the whole State of California, that number is 32 percent.

MERITO, which is the Spanish word for merit, was launched in fall 2002 to help the diverse citizenry living around Monterey Bay "better understand the importance of protecting our resources and their special qualities," Templeton says. She believes that exposing more students and community members to resource issues will, in the long run, contribute to a more diverse National Oceanic and Atmospheric Administration (NOAA) workforce.

An after-school program for schools and community groups is in fact one of the many successful MERITO projects.

The Watershed Academy was developed through MERITO's collaboration with nonprofit organizations, state and federal government agencies, schools, and academic institutions. An analysis of gaps in area marine and watershed education indicated a "huge need" for science for fifth through eighth grade students who are learning English as a second language.

The Watershed Academy presents English-learning students with watershed and ocean science issues, and gives them the opportunity to go on field trips that expose them to local resources, often for the first time.

Specially designed academy education materials support state and national standards, and educators receive training on how to implement the program. Fourteen schools and groups currently host the program.

MERITO has created a bilingual Web site and has published the bilingual children's book *Coralito's Bay*, written by poet and author Juan Felipe Herrera and illustrated by artist Lena Shiffman. Other

Photo courtesy of Monterey Bay National Marine Sanctuary

Community members involved in adult education programs bring their families out to a MERITO Kayak Day to experience the Monterey Bay National Marine Sanctuary firsthand, reinforcing the land-sea connection.

MERITO projects include education programs for adults learning English, community field experiences, and internships for students from area colleges and universities.

Templeton notes that all MERITO programs are developed with a comprehensive evaluation plan.

The Channel Islands National Marine Sanctuary is working to implement MERITO programming, and other national sanctuaries are interested in using it as a model for multicultural education.

"We have developed this as a model that different agencies can apply and adapt to their own needs," Templeton says. "To make a difference, we need all of our community members to understand the importance of protecting our watersheds, and marine and estuarine resources." ❖

For more information about the MERITO program, point your browser to http://montereybay.nos.noaa.gov/educate/merito/welcome.html. You may also contact Michelle Templeton at (831) 647-4211, or Michelle.Templeton@noaa.gov.

Linking Coastal Decision Makers with Information and Resources in New Jersey

Coastal resource managers in New Jersey have at their fingertips regional-specific background information, case studies, and resources, such as model ordinances and places to go for local training on a variety of their most pressing management issues. All this information and more have been compiled into a single, easy-to-navigate Web site by staff members at the Jacques Cousteau National Estuarine Research Reserve (NERR).

"More or less what we tried to do," says Lisa Weiss, watershed coordinator for the Jacques Cousteau NERR, "was take all the information that was out there and narrow it down to the top-notch information from around the country and the information that was specific to New Jersey and bring it all together in one cohesive place."

The result is the Coastal Resources Toolkit, which is "one stop shopping" for elected officials, members of local land use boards, and municipal or county government representatives who make frequent decisions about how New Jersey's coastal lands are used, Weiss says.

Topics covered include urban sprawl, wastewater management, stormwater management, severe storms, conservation easements and land trusts, and public access. Under each topic are links to background information, a case study featuring a New Jersey municipality, and a "toolkit" of on-line resources, model ordinances, and potential providers.

The idea for the Web site, Weiss says, came from the needs assessment and market analysis the NERR completed when starting its Coastal Training Program. The Coastal Training Program is an initiative by the national reserve system to offer science-based education and training to coastal decision makers.

What the Jacques Cousteau NERR discovered after completing its needs assessment and market analysis, says Weiss, was a "disconnect" between what decision makers said they needed and the myriad of resources being offered by organizations in the state.

Many resources housed at the Jacques Cousteau National Estuarine Research Reserve's Education Center in Tuckerton, New Jersey, are now on-line.

An image taken from an on-line case study featured on the reserve's Coastal Resources Toolkit.

Photos courtesy of Jacques Cousteau National Estuarine Research Reserve

"We weren't just taking every Web site we found on a Google search."

Lisa Weiss, Jacques Cousteau National Estuarine Research Reserve

Not wanting to duplicate efforts, Weiss and other reserve staff members decided to "form a portal" to bring together the people that offer programs with the people who want them.

Combing through and selecting the information took Weiss about two to three months per topic. The information was compiled from state and reserve resources, as well as Internet searches.

"We weren't just taking every Web site we found on a Google search," Weiss notes. "We really quality-checked all the Web sites and picked the ones that were most relevant for New Jersey."

The Coastal Resources Toolkit has been on-line for about a year and is evaluated by an on-line survey and Internet statistics that track the number of visitors. Information is often added or changed, and volunteers check the Internet links to make sure they are current.

"It's ever evolving," says Weiss. "It's really meant to be a dynamic tool that's continually changing to meet the user's needs." ❖

To view the Jacques Cousteau National Estuarine Research Reserve's Coastal Resources Toolkit, point your browser to www.jcnerr.org/coastal_training/. For more information, you may contact Lisa Weiss at (609) 812-0649, or weiss@imcs.rutgers.edu.

Living Reef at Heart of Hawaii Public Awareness Campaign

Sandy beaches, big wave surfing, an abundance of exotic marine life—all reasons that millions of visitors travel every year to the Hawaiian Islands, and all a result of the archipelago's 410,000 acres of nearshore coral reefs. These same reefs are facing threats from overfishing, alien species, development and agriculture, recreational impacts, and marine debris, such as discarded fishing gear.

"Reefs are an integral component of the Hawaiian way of life."

Athline Clark, Hawaii Department of Land and Natural Resources

At risk is more than the $800 million in gross revenues generated annually by Hawaii's nearshore reefs, says Athline Clark, special projects program manager for the Hawaii Department of Land and Natural Resources' Division of Aquatic Resources. What is at stake is the Hawaiian way of life.

"Reefs are an integral component of the Hawaiian way of life," Clark explains. "Our goal is to raise awareness about the threats and let people know how their actions help reduce these impacts."

To help prevent the further decline of the islands' coral reefs, more than 40 state, federal, and nongovernmental organizations have spent the past two years developing Hawaii's Living Reef Program, a campaign to build public awareness of the importance of coral reefs to Hawaii's way of life.

"We realized that many people were doing different things [related to coral reefs], and we needed to start to work together," Clark says. "Meetings were held on all the islands to find out what the primary needs were, and public awareness came up as the number one issue."

A public relations firm helped develop campaign materials that are being used by all the partners, including a logo and the slogan, "A Living Reef Gives Our Islands Life." A Web site offers basic information about Hawaii's coral reefs, educational materials for teachers, games for kids, and a calendar of events.

A new awards program recognizing groups and individuals that take actions to care for and preserve the islands' coral reefs has been started, and awards were presented for the first time in March. Tiffany and Co. designed and sponsored the awards.

Other campaign activities include advertising, an educational outreach effort to businesses and services that impact the coral reef, and radio and television public service announcements.

"From the start, this has been a collaborative effort," Clark notes. "We wanted agreement on everything."

Most of the partnering agencies contributed funding for the campaign, and much in-kind support has been donated by businesses, private foundations, and other groups.

Christine Brammer, the Oahu programs coordinator for the Hawaiian Islands Humpback Whale National Marine Sanctuary—one of the campaign partners—believes that the Living Reef Program "is an excellent model for others to follow. It allows organizations to network and effectively utilize each other's resources to get a better, more comprehensive message out to the public."

Similar efforts are under way in the Virgin Islands, Guam, and the Commonwealth of the Northern Mariana Islands.

"The bottom line," says Clark, "is that we hope to be able to raise the awareness that each individual's actions can make a difference." ❖

For more information on Hawaii's Living Reef Program, point your browser to www.hawaiireef.org. You may contact Athline Clark at (808) 587-0099, or Athline.M.Clark@hawaii.gov.

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industry to reduce its application of nitrogen-based fertilizers, controlling urban and suburban nonpoint sources of pollution, and upgrading sewage treatment plants.

While a number of the initiatives in the plan are under way, Day says, national coordination, prioritization, and collaboration are missing.

Day and a partnering scientist in Ohio estimate that "if just two percent of agricultural land in the Mississippi basin was strategically selected and made into wetlands areas, we could probably reduce 50 percent of the nitrogen getting into the Mississippi River." Other benefits might result, as well, such as reduced flooding.

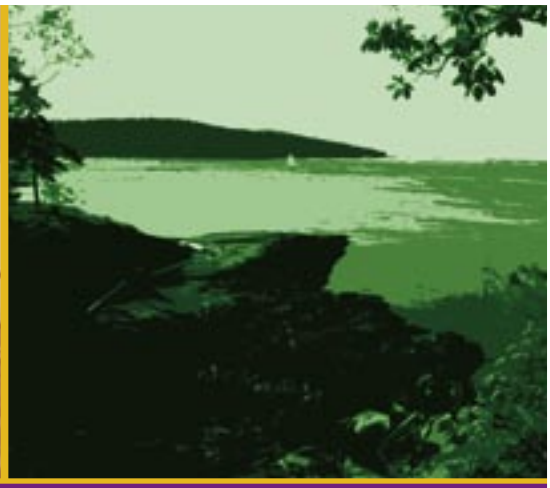
Chris Piehler, senior environmental scientist for the Louisiana Department of Environmental Quality, suggests that state and local efforts to address water quality problems and control pollution could play an increasingly important role in reducing runoff that results in hypoxic areas.

"If we can get everyone to take care of their own water quality problems, the Gulf of Mexico will benefit," Piehler says.

"In whatever regulatory capacity coastal resource managers make decisions, they should take into account the whole watershed and what is happening to it," Rabalais says. "They need to be cognizant and supportive of anything that is shown to be a good concept for the management of nutrients."

She adds, "It's going to take everybody working together" to reduce the gulf's hypoxic zone. "We're going to have to work beyond traditional boundaries." ❖

For more information on the hypoxic area in the Gulf of Mexico, contact Nancy Rabalais at (985) 851-2836, or nrabalais@lumcon.edu; John W. Day at (225) 578-6508, or johnday@lsu.edu; or Chris Piehler at (225) 219-3609, or chris.piehler@la.gov.



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