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 CHESAPEAKE BIOLOGICAL LABORATORY



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CBL Ponders Katrina's Aftermath

Not only has the destruction caused by Hurricane Katrina dwarfed previous natural disasters in our country, but it also has exposed social, economic, and environmental issues. The connection between humans and our environment could not be clearer. With Hurricane Katrina uppermost in the minds of many, we have suspended our regular features, so that we may reflect on the environmental concerns now facing the people of New Orleans and the Gulf Coast. At the same time, we are compelled to consider human activities that have contributed to the devastation.

From CBL's Director

By DR. MARGARET PALMER

AS I ENTER MY FIRST FALL AS the Chesapeake Biological Laboratory's (CBL'S) new director, we are all a bit consumed with thoughts of the devastation left by Hurricane Katrina. The images we see in the media and



Aerial view of New Orleans, August 31, after the levee was breached (photo: NOAA).

the news we have received from our colleagues at damaged or destroyed Gulf Coast laboratories is saddening. While our first concerns are for the people that have been impacted, we also are reflecting on the environmental implications and how scientists can contribute to making sure such a tragedy does not occur again. The flood waters in and around Gulf Coast cities that are now heavily polluted, pose a great risk for fragile ecosystems, coastal fisheries and the people of the region.

This region is but one of many linked *social-ecological systems*. The pairing of these two words underscores the fact that human communities and ecological processes interact so extensively that people and their actions not only shape the environment, but, in turn, are shaped by that environment. The good news is that both communities and ecological systems have the ability to adapt to and recover from disturbances. Additional welcome news is that scientists, many of them from CBL and our sister campuses, the Horn Point and Appalachian Labs, have contributed a great deal to understanding how riverine and coastal ecosystems influence response to and recovery from hurricanes. Further, ecological restoration is now a growing science that can inform effort to assist in nature's healing process.

If we design and build with nature in mind, future damage from storms will

See Palmer, page 2

Death By a Thousand Cuts

BY DR. DONALD BOESCH

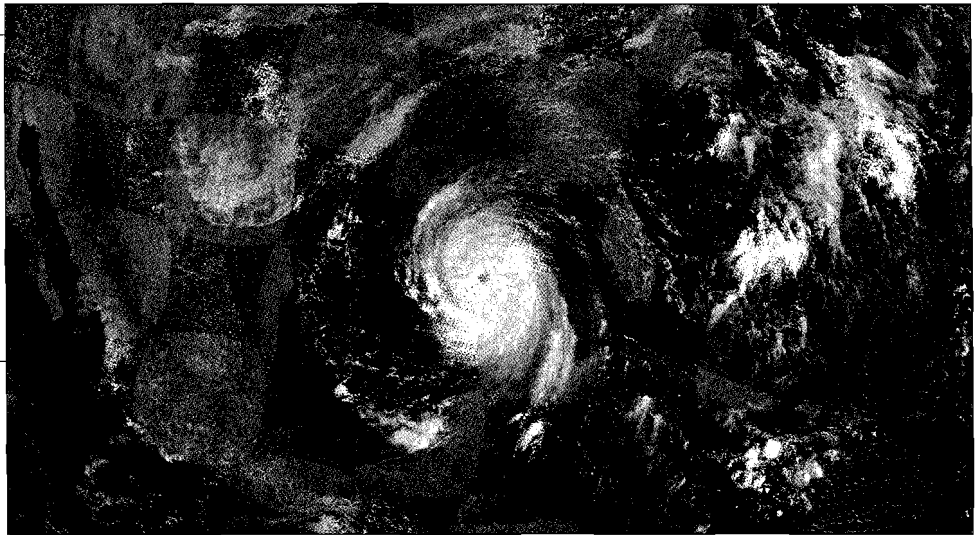
The steps needed to slow down and ultimately reverse the rate of wetland loss have been understood by the scientific and engineering community for more than 20 years, says Dr. Donald Boesch.

New Orleans is the childhood home of Boesch, President of the University of Maryland Center for Environmental Science. As a boy, Boesch fished in the nearby marshes. In the 80s, he directed wetland research for Louisiana Universities Marine Consortium. The following is from an opinion piece by Boesch, published in the Baltimore Sun, September 1, 2005.

While hurricane destruction and personal tragedies have been and will always be a risk of living on the Gulf Coast, our society has let these risks grow over the years.

....for low-lying Louisiana, vulnerability to hurricanes has increased dramatically because the state's vast coastal wetlands, which slow down storm surges, have been deteriorating and disappearing.

This process of wetland destruction began with the building of flood protection levees almost all the way to the mouth of the Mississippi River during the 19th and 20th centuries. While this protected the expanding population, it



Hurricane Katrina on August 2, 2005. National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA).

stopped the periodic over-bank flooding that provided sediments nourishing the wetlands, allowing them to keep pace with sea level in the rapidly subsiding delta.

Much worse, extensive channels were dredged through the wetlands for navigation and more widely for access to oil and gas wells and pipeline corridors. This death by a thousand cuts hastened the wetland deterioration by many decades. Some of the responses to wetland loss — for example, impounding vulnerable wetlands with small levees in order to “manage” them — only made matters worse.

....The steps needed to slow down and ultimately reverse the rate of wetland loss have also been well understood by the scientific and engineering community

for more than 20 years. The river levees need to be breached in strategic places and control structures built to allow the flow of river water and sediments into the expanding shallow bays.

....It's too bad that it had to take massive human tragedy and a spike in the price at the gasoline pump, but perhaps the nation will now grasp the shameful deterioration of the Louisiana coast. That coast is of enormous importance to the nation in terms of fisheries, wildlife, oil and gas production and transport, shipping and rich cultural heritage, as well as flood protection.

Full-length article available at:
<http://www.commondreams.org/views05/0901-20.htm>.

Palmer on Designing with Nature in Mind, continued from p. 1

be lessened. Sure, people and property can be positioned in less hazardous places, but it also is true that restored wetlands and floodplains can be designed and positioned to help reduce

future storm surges. It is also important that as damaged regions along the Gulf Coast are restored, efforts are made to protect existing coastal marshlands that are in good health. These healthy

ecosystems both depend on and define how humans live on the land.

Severe weather may become more common under future climates. How we treat our coastlines, rivers, and

their associated floodplains and wetlands will either make a bad situation worse or make it better. If we ignore nature's lessons and dismantle what healthy rivers do for us, the devastation will be worse.

Revealing the Cost of Wetland Loss

BY DR. DENNIS KING



“How much lower would the human and economic costs of Hurricane Katrina be if the wetlands that once buffered the region against hurricanes and flooding were still there?” asks CBL environmental economist Dr. Dennis King.

The colossal cost of Hurricane Katrina hits home every day in news stories about lost lives and unimaginable human misery. These stories of human costs are beginning to be supplemented with preliminary estimates of the dollar costs associated with property damage, lost livelihoods, relocating victims, rebuilding cities, and so on. Already, these costs are estimated in the hundreds of billions and are growing every day; they will most certainly reach a trillion dollars or more. Behind the scenes, research is underway to assess what portion of these costs were avoidable, and, in particular, how highly risky land use decisions contributed in predictable ways to this disaster. These assessments will need to be done quickly if they are to have any hope of influencing how federal and state agencies prioritize spending to rehabilitate the region.

As someone who frequently is asked to measure the value of wetlands and to compare them with the economic benefits of allowing wetlands to be developed into building lots, I am particularly interested in how this research

answers two related questions: How much lower would the human and economic costs of Hurricane Katrina be if the wetlands that once buffered the region against hurricanes and flooding were still there? Were the economic



Canals built on the north shore of Lake Pontchartrain drained marshlands to create pasture land (photo: NOAA, 1996).

benefits of allowing this wetland development worth the costs we are experiencing now?

The answer to these questions should be of interest to everyone responsible for managing land development and implementing and enforcing

environmental regulations in the Chesapeake Bay region. Most attempts to justify wetland conservation and spending on wetland restoration emphasize wetland contributions to fish and bird habitat, recreational opportunities, aesthetics, and other obvious values. Wetland benefits associated with their capacity to reduce damage from storms, surges, waves, and floods tend to be viewed as too “vague and distant” to influence near-term land use decisions, especially when compared with the “clear and present” benefits of allowing wetlands to be developed into building lots.

The number crunching is just starting to establish how wetland conservation in the Gulf Coast region would have mitigated the cost of Hurricane Katrina to residents and the rest of us. I have no doubt that the results will provide me with something wetland development advocates have been pressing me to show them for many years — a concise and practical illustration of the dollar value of wetlands and the economic rationale for wetland conservation.

Contaminated Waste: An Unprecedented Disposal Problem

BY DR. JOEL BAKER, PROFESSOR OF ENVIRONMENTAL ORGANIC CHEMISTRY

This disaster presents an unprecedented waste disposal problem. An immediate concern is the potential for illness among the responders. Fatigue coupled with exposure to contaminated water and mud left from flooding may lead to

health risks. Longer term issues include figuring out how to transport and dispose the large quantity of highly contaminated mud, materials, and houses. We can assume that when the water recedes, a lot of contaminated muck, similar to that at the bottom of

the Baltimore Harbor, will be left behind. While, specific rules guide the disposal of contaminated waste, no disposal sites currently exist for this much waste. The problem is further compounded by the need for expediency. Those determining the course of

action will need to weigh immediate risks with environmental issues and regulations.



Kay Simkins -- Volunteer Extraordinaire!

BY SCOTT MCGUIRE

She is a very busy person these days, but not just because of her capacity as a docent and tour guide at the Chesapeake Biological Laboratory Visitor Center. Kay Simkins is involved with many other organizations. From Historic St Mary's City, Cecil's Old Mill, and St. Clements Island Museum to the Patuxent River Power Squadron, anyway you look at it, Kay is quite involved.

In fact, Kay's spirit of volunteerism is rarely matched. Recently elected as Executive Officer representing District 5 of the United States Power Squadron, Kay works to fulfill the organization's mission of safe boating education for all ages and civic service. Sadly, as a result, she has had to cut back on some of her other volunteer work to focus on her work with the Squadron. Still, Kay remains a reliable docent and tour guide at CBL.



Kay says that it is not just the staff and other volunteers that keep her coming back. To her, CBL "is a very special place that has a tremendous educational value, because, unlike many other places, the CBL visitor center relates to more than regional and cultural history."

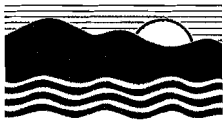
Kay sees great benefit to helping visitors connect with the research underway

at CBL and strives for them to go away with the idea that everyone makes a difference.

Every other Wednesday afternoon Kay is on hand to lead visitors on a free tour of the facilities. She feels the tours are the best opportunity for visitors to "relate to the research underway."

Tour Our Labs

Lab tours start at the Visitor Center every Wednesday at 2 pm. The tours last about an hour and focus on the people involved in research at CBL. They are not recommended for small children. For groups of more than 15 people, please make advanced arrangements by calling 410-326-7491.



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Fisheries Likely to Revive

BY DR. EDWARD HOUDE

Gulf Coast fish stocks are resilient. It is likely they'll recover after Katrina; the greatest challenge to the Gulf fishing industry is lost infrastructure, suggests Dr. Edward Houde, CBL fisheries scientist.



The disruption of the Gulf fishing industry from Katrina has been huge. The Gulf shrimp fishery is the nation's second most valuable commercial fishery, and Louisiana's commercial and recreational fishing industries generate annual revenues of over \$2.7 billion. While I cannot predict the long-term impact of Katrina, it is clear that the combination of destroyed infrastructure (e.g., processing plants, lost fishing vessels, increases in fuel prices, etc.) will make for a slow recovery. Likely, Federal grants and low-interest loans will aid in the recovery. The recreational fishing industry also will feel a big economic impact, more from massive losses and disruptions to people and fleets than from hurricane effects on fish.

I have no crystal ball, but looking at effects of past hurricanes, I suspect the recovery of shrimp and fish populations will be less problematic than the industry's infrastructure. Shrimp fishery catches have been strong, producing 110,000



Shaped and battered by nature: Mississippi coast after Hurricane Camille, August 1969 (photo: NOAA).

to 150,000 tons a year, despite poor marketing conditions. Adult shrimp live and spawn offshore in the Gulf; if the estuarine nursery areas critical for juvenile production are still functional and productive after Katrina, then shrimp production likely will remain high.

As for blue crabs, the species is resilient; its life cycle allows for fast recovery from hurricane perturbations. Still, the availability of crabs, even in the Mid-Atlantic could be down this winter.

Oysters and oyster grounds were deci-

mated by Katrina. Based on historical recoveries from hurricanes, my guess is that oysters will recover, but not for two or more years, and availability of oysters in the Chesapeake region will suffer as a consequence.

Paradoxically, the red snapper population and fishery might benefit, at least temporarily, since this fishery has been depressed for decades due to high by-catch mortality of small red snapper in shrimp nets.

While the hurricane could have very adverse environmental effects on estuaries and coastal bays, I believe its offshore impact will be less. Likely, the extensive "Dead Zone" of low oxygen in the Gulf was reoxygenated by hurricane winds. However, if estuarine nurseries have suffered long-term damage, then offshore-spawning shrimp, croaker, red drum, and menhaden that rely on estuaries as juvenile nurseries could be impacted. Historically, hurricane winds and floods have not proved to be catastrophic in this regard.



Revisiting Hurricane Isabel

In late summer 2003, Hurricane Isabel brought record-high storm surges and winds into the Chesapeake Bay region. The level-2 hurricane "was responsible for physical and biological changes in Chesapeake Bay on a variety of spatial and temporal scales," according to the soon-to-be published proceedings from a 2004 regional conference held on the subject. Scientists from the University of Maryland Center for Environmental Science (UMCES) presented their research on environmental impacts of the storm at the conference. CBL's Drs. Edward Houde and Sukgeun Jung were among those who conducted fisheries research. Some of the conference findings, including the long-term influence of rising sea levels, are now depicted on a new educational panel outside the Visitor Center at the Chesapeake Biological Laboratory.

Teachers Get Hands Into Chesapeake Research

By Rebecca Wolf

For Maryland teachers wanting to dive into marine research, there could not have been a better summer program than that offered through the Environmental Science Education Partnership this past summer. For seven weeks, 12 middle and high school teachers were elbows deep in research on the Chesapeake Bay.



Elizabeth Martz plans to share what she learned about fish anatomy with her middle schoolers.

“The goal is to give teachers exposure to current science research that they can

share with their students” says Jackie Takacs, who co-coordinates the program.

After a week-long workshop, each teacher went to one of four University of Maryland research facilities to work alongside scientists. The Chesapeake Biological Laboratory (CBL) hosted two middle-school teachers, Elizabeth Martz from Frederick County public school system and Leeanne Rogers from Calvert County public schools.

Martz was exuberant about her experiences working with Prof. Tom Miller’s fisheries research group. The highlight was joining a six-day sampling cruise.

“Since fish can see the net in the daytime, we trawled from 7 at night until 7 in the morning. We had lights on the station where we counted the fish,” says Martz, who took notes as quickly as possible while crew members shouted out the names, lengths, and weights of eel, catfish, butterfish, menhaden and other species in the catch.

Back at the lab, Martz learned more about the rudiments of research, as she prepared samples for age and dietary analyses.

In the meantime, Leeanne Rogers was in Carys Mitchelmore’s toxicology lab, performing molecular tests to detect human pathogens in oysters. Rogers had the good fortune of assisting in research assessing if and to what extent Asian oysters accumulate bacteria or viruses that

could be hazardous to humans.

By summer’s end, both women had completed instructional activities for their students. “I can combine science with a lot of creativity in the classroom to get my students motivated about scientific research,” said Martz enthusiastically.

“Now, that all the teachers are back in class, they’ll refine their lessons, and next spring they’ll share them with colleagues at the 2006 Maryland Association for Environmental and Outdoor Educators Conference,” says Takacs.



Leeanne Rogers enjoyed her experience so much that she readily accepted a part-time after-school job as an assistant in Dr. Mitchelmore’s lab.

More About Summer Teacher Programs

BY JACKIE TAKACS

The Environmental Science Education Partnership (ESEP) bridges the gap between the research community and public audiences. Our mission is to provide opportunities for teachers and students of all ages to participate in science research.

We also strive to promote environmental science literacy, particularly within the context of the Chesapeake Bay and its watershed.

The partnership offers innovative educational and outreach programs that build directly on science research at the University of

Maryland Center for Environmental Science (UMCES) and Maryland Sea Grant (MDSG). Teachers, students and citizens work side-by-side with scientists, explore authentic scientific data, and learn state-of-the-art research tools and techniques.

For more information on ESEP programming at CBL, contact Jackie Takacs at 410-326-7356 or Takacs@cbl.umces.edu. See the ESEP website for updates: www.esep.umces.edu.