

# SUSTAINING OUR ESTUARIES

Frank Smith, Communications, School for Marine Science and Technology, University of Massachusetts Dartmouth



“All around the world,” says Brian Howes, “we are seeing significant declines in coastal systems, certainly along the whole of the U.S. east coast, where a majority of the population lives in a narrow strip of land along the coast. Our job is to figure out how people can continue to live there and still maintain the quality of environment that they came here for.”

A professor at UMass Dartmouth’s School for Marine Science and Technology, Howes has been studying estuaries long enough to remember a different time. “When I entered this field, we spent our time trying to determine which estuaries had to be protected and which had to be restored, and if there was a problem, what was causing it. Now, nearly all our estuaries are beyond needing protection; they all are in various stages of decline and require remediation.”

Howes is Director of the SMAST Coastal Systems Group, the scientific side of the Massachusetts Estuaries Project. In partnership with the state’s Department of Environmental Protection, Howes’ group is assessing the nitrogen status of 89 Massachusetts embayments where salt water mixes with fresh water.

Nitrogen is the prime culprit in estuarine degradation. It’s also one over which humans have some control, mainly because they generate so much of it.

In a pristine system, this crucial nutrient enters an estuary from the surrounding watershed at a rate that supports the base of the estuarine food web, and so, indirectly, the whole range of species that spends any part of their life cycle there. But inject an excess of nitrogen, and a cascade of negative effects follows. Opportunistic species such as marine algae react with spectacular blooms, and inevitable die-offs that deplete the water of oxygen. The consequent choking-off of vascular plants like eelgrass erases the habitat on which a multitude of species depends. Unchecked, the excess nitrogen input will destroy everything we value in the system.

## Where Is the Nitrogen Coming From?

Lindsey Counsell is Executive Director of Three Bays Preservation, Inc. Since 1998, he and his organization have been working side-by-side with the Coastal Systems Group, monitoring the complex Three Bays estuary system in Barnstable.

“When we started,” Counsell recalls, “it was widely held that fertilizer was a large contributor to

our nitrogen problem. The town was getting ready to craft an ordinance banning fertilizer. But we came to realize that we didn’t know how much fertilizer was running off into the estuaries or even whether or not it was a problem. The proposed ordinance was more or less of a knee-jerk reaction based on speculation. Fertilizer may have been a problem, but no one could tell us for sure.”

“So we began field sampling. Three Bays paid for the first three years of sampling—at \$40K per year, not including staff—staging concerts, selling chowder at Maritime Day, whatever it took. And our doubts were borne out. Fertilizer turned out to contribute only 5-8% of the total nitrogen delivered to the estuary, whereas wastewater contributes 75-80%.”

“That was one big surprise. The other was finding out that opening channels and dredging inlets to enhance tidal flushing would only make a couple of percentage points improvement in habitat quality. We were looking for 5-10%, but the modeling said otherwise.”

The model Counsell refers to is the one used by Coastal Systems to integrate the water quality, hydrodynamic, and nutrient data collected by their scientists and by the volunteer monitoring groups that many municipalities have organized. It simulates not only the estuary in question, but also the watershed that feeds it, and how the two interact. Using this tool, Howes and company can predict how particular land use decisions in the watershed will affect the health of the estuary.



## Give me a Number

“Engineers need numbers,” says Howes. They target their designs to numbers. Our group provides quantitative targets for restoring a system with a very small margin of uncertainty. Our job is to find the cheapest way for the town to get the job done.”

“And there are a number of options available to us in our search for the cheapest route to restoration—not just building treatment plants and sewers, but opening channels, managing stormwater ... even restoring a freshwater pond in the same watershed can reduce the nitrogen load that reaches the estuary.”

## Pave Paradise

“Pave paradise—put up a parking lot,” Joni Mitchell famously sang in “Big Yellow Taxi.” In

the case of our estuaries, however, the paving won’t be necessary.

“If nothing is done,” Counsell projects, “the estuaries will continue to decline at an accelerated rate, and our bays will become merely places to park boats. People will row out to their boats, and go somewhere else for recreation.”

“Without restoration,” says Howes, “we face wholesale loss of these critical resources, and of the fish, shellfish, and bird life that depend on them. The terrestrial analogy is a major forest fire, or a clear-cut forest.”

“Our targets are eelgrass and benthic organisms, but along with these things comes habitat for fisheries, not only commercial species, but recreational fishes, too—flounder, stripers, bluefish, horseshoe crabs, bay scallops, blue crabs—and bird life such as sea ducks, geese, osprey. And along with the eelgrass comes sedimentation control.”

“It’s one of those cases where you have convergence between what the environment needs and what people want. It’s not like the snail-darter versus electric power.”

## The Environmental Challenge of our Generation

The problems our estuaries face today have been a long time in coming. And as time passes, we are losing important generational knowledge.

Counsell recounts comments he’s heard from locals. “People say, ‘Twenty-five years ago, I could walk down to my dock and get all the steamers, quahogs and oysters I wanted. But I haven’t seen a healthy oyster here in 10 years.’”

“We are losing the people who remember what our estuaries were like a few decades ago,” Howes warns, “and with their passing, we will lose the impetus to restore those estuaries. What does ‘restore’ mean if you don’t remember how things were?”

“We’re at a crossroads. If we fail to restore these estuaries now, we might not find the will or the resources to restore them in the future. On the other hand, the up side is that once we restore them, we know how to maintain them in perpetuity.”

“Every generation is given its unique environmental challenge,” he says. “This is ours.”

