The Standard Environmental Narrative

The Barnegat Bay saga exemplifies the politicization of environmental science.

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Two journalists from the *Asbury Park Press* in New Jersey recently won a $10,000 prize from the Generoso Pope Foundation for their series, "Barnegat Bay under Stress." In August 2010, the writers laid out a scenario of ecological disaster befalling the bay lying between Long Beach Island and the Atlantic Ocean on the New Jersey shore.

The series documented

> how over-development, polluted storm water runoff carrying fertilizer residue, an infestation of stinging jellyfish and decades of government inaction have conspired to push the once-thriving ecosystem of the bay to what some experts fear is the brink of collapse. While the bay contributes an estimated $3.3 billion per year to the region's economy, restrictions on swimming and a drop off in marine life have raised grave concerns among scientists, environmentalists, legislators and the countless people who rely on and enjoy the bay.

The article continued, "The series became a focal point for saving the estuary. By the end of 2010, the governor had provided $110 million in rescue funds and signed the toughest fertilizer control law in the nation."

The Barnegat Bay story typifies a common saga: An environmental crisis unfolds, created by private enterprise. The news media and non-government organizations help guide legislators and environmental regulators toward a wise set of policies. In the end, a precious environmental treasure is saved. Call this the standard narrative on environmental regulation.

Such feel-good stories are institutionalized in modern America. But as these stories unfold, many important policy questions are never asked because people, from politicians to leaders of environmental organizations, do not want them to be answered. We are supposed to accept the standard narrative uncritically and not ask the hard questions.

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Barnegat Bay

Barnegat Bay is a shallow coastal lagoon–type estuary located between Long Beach Island and the New Jersey mainland. The southern tip of the 40-mile-long island is just above Atlantic City. The island has seen a lot of the same kind of development as other coastal recreation areas, including numerous summer cottages and larger homes, along with restaurants and shopping areas.

The bay is shallow and poorly flushed, with a low tidal range that lends itself to the proliferation of algae. Algae blooms are evidenced in the earliest records of the bay in 1927. Furthermore, a number of activities initiated a century ago now contribute to pollution issues in the bay, the most important being the ditching of coastal wetlands in an effort to combat malaria.

Because malaria has virtually disappeared in the United States, few people know that until about 70 years ago, the mosquito-borne disease was common in many U.S. states. Public policies in response to the disease emphasized both the use of insecticides and the draining of wetlands that bred mosquitoes.

New Deal projects cut about 1,600 miles of ditches through

the bay's wetlands in an attempt to eliminate mosquitoes. While they achieved some success, ditching fundamentally altered how the wetlands worked. Properly functioning wetlands are essential to any bay restoration effort. Wetlands remove waste from the environment much like kidneys remove waste from the human body, and elimination of those critical places also increases pollution in waterways and reduces wildlife habitat. However, the EPA has no authority to mandate wetland restoration and, as a result, this vital link is being ignored in the current narrative. A recent study found that rehabilitating U.S. wetlands may provide a far better answer to the nutrient loading problem than building storm water treatment facilities, but making such a policy change would require "a reinterpretation of federal requirements."

Barnegat Bay historically had a second inlet open periodically as a result of intense storms. The second inlet allowed the estuary to flush itself of accumulating organic material and nutrients. However, human-conducted hardening of the barrier island in order to protect property has prevented the reopening of the second inlet. Modifications to the current inlet to keep it navigable have increased the time it takes for the bay to flush and its tidal range to decrease, which promotes not only an increase in algae but often intense blooms. However, the EPA does not regulate flushing or tidal range and disregards that vital issue.

Other human activities, including overfishing, the building of bulkheads, suppression of the natural fire cycle, habitat loss, and water diversion have challenged Barnegat Bay. However, no impact was greater in the last century than the collapse of a keystone species — the oyster — as a result of overfishing and the effects of fatal diseases that ravaged the bay's oyster beds in the 1950s and 1960s, from which they have still not recovered.

Oysters are important to East Coast estuaries, as their reefs provide essential habitat for fish and invertebrates. Also, they produce a unique fecal pellet that promotes the conversion of biologically available nitrogen back into inert nitrogen gas. Oysters once filtered over a billion gallons of Barnegat Bay's water per day while feeding on algae. However, the EPA does not regulate disease, which means this important contributor to the deterioration of Barnegat Bay is ignored by environmental groups, the media, and the government. In fact, the New Jersey Department of Environmental Protection recently ordered the removal of a disease-resistant oyster strain stocked with private funds in the state's northern waters, claiming the agency did not have the funds to monitor these new shellfish beds from illegal poaching. However the state is committing $100 million for storm water treatment, which oysters did far more efficiently and for free.

Search for new sources | Environmental groups and state and federal environmental regulators formerly claimed Barnegat Bay's problems arose from nutrients coming from fertilizer residue that wash into the bay. Last year, after the New Jersey legislature passed "Save the Bay" legislation on fertilizers, environmentalists declared that the law was just the beginning, as the group is turning its focus to coal-fired electric power plants, which they blame for deposits of "too much nitrogen" in watersheds.

Thus, the bay is a focal point of the larger environmental action against the burning of coal. As the "Save the Bay" website proclaims: "On account of our burning fossil fuels, each raindrop has too much nitrogen as it falls. That is the biggest source." The "solution," then, will not only be restrictions on items like lawn fertilizer, but also controls upon the creation of electricity and hundreds of other things people do in daily activities.

Will these new restrictions ultimately reduce algae blooms in Barnegat Bay and lead to a cleaner, healthier, and more productive body of water? We think not, because the "solutions" target an insignificant component of what troubles the bay.

Controlling nutrients

In the current Barnegat Bay environmentalist narrative, every surface water problem is caused by excessive nutrients. Declin-

ILLUSTRATION BY MORGAN BALLARD

ing sea grass in Barnegat is supposedly not the result of wasting disease, dredging, or natural variability, but is only the result of increasing nitrogen. Shellfish are not declining because of dredging, overharvest, or salinity changes, but only because of increasing nutrients.

An 1888 U.S. Fish Commission survey found Barnegat Bay was infested with sea lettuce. Rutgers University scientists in 1968 were hired to investigate a proliferation of sea lettuce so thick that it was considered "a nuisance to navigation, recreation, and public health." Today, the government claims abundant sea lettuce is evidence of nitrogen enrichment.

A recent increase in stinging jellyfish numbers that environmentalists blamed on increasing nitrogen galvanized public and legislative action. However, no known scientific study has established a connection between jellyfish numbers and nitrogen levels in the bay. As noted earlier, because of the modifications to the bay's hydrology, this water body is highly susceptible to increased algae production. Regulators claim that these modifications have made Barnegat Bay more sensitive to nitrogen, requiring nitrogen levels to be controlled, while the other problems of the bay — and their solutions — are ignored.

Systems that have healthy populations of creatures that eat algae are highly productive. However, where there is little feeding, algae can multiply out of control and block sunlight to bottom-dwelling rooted plants, depressing oxygen levels.

For example, if a fence surrounding a pasture keeps out grazing animals such as sheep, grass (analogous to algae) grows waist high. But put sheep in the pasture and the grass is cropped quickly. A pasture with sheep has both high levels of nutrients and low grass height. However, if the EPA managed the pasture, it would neither manage sheep nor mow the grass. Instead, it would try to starve the pasture of nitrogen, thus weakening the entire system. Regarding Barnegat, officials have no plans to restore algae-eating oysters, instead substituting projected expenditures of $100 million for storm water management and micromanaging land-use policies.

This is not to say that nitrogen reduction programs uniformly are of little value. Nitrogen reduction efforts in the Chesapeake Bay watershed have demonstrated value. (Contrary to popular belief, agricultural runoff, not industrial waste or "development," has created most of the water quality problems for the Chesapeake.) However, Barnegat's nitrogen levels are already low, as we explain below, and the EPA's regulation of nitrogen as a pollutant fails to appreciate that nitrogen is essential to life and estuarine productivity. Furthermore, the EPA ignores the risks involved when nitrogen levels are pushed too low, with negative consequences to fisheries and wildlife resulting from lack of nutrients.

Barnegat Bay ultimately cannot be restored until the functions once provided by wetlands and oysters are restored. But regulatory agencies have taken the approach of starving algae of food and, as a result, have eliminated any hope of restoring the bay to a highly productive system. They also fail to appreciate that, as nutrient levels reach low levels, a group of small and highly noxious algae begins to proliferate. These algae are not preferred food sources and, as such, lowering nutrients actually can increase algae blooms. These "brown tides" have plagued Barnegat, but they proliferate when nutrient levels are so low that they approach the detection point. (Amazingly, brown tide is used by the agencies as an example of too much nitrogen.)

Politics of nitrogen | Nitrogen, unlike conventional "pollutants," is essential for life. It enters the environment through natural means such as lightning and bacterial conversion of inert nitrogen gas to more biologically useful forms. It is then stored in biological sinks or released and converted biologically back into inert nitrogen gas.

Nitrogen can also have anthropogenic sources, such as manure, fertilizer, vehicles, wastewater, and energy production using combustion processes. Nitrogen can be transported long distances in the atmosphere and delivered by both wet and dry deposition processes to drainage areas hundreds if not thousands of miles from the generation site. Because of the complex way that nitrogen moves through the environment, policies to control it can affect any and all land- and energy-use decisions.

Increasing nitrogen levels can be positive when they lead to increases in fin and shellfish production, and negative when excessive concentrations lead to depletion of oxygen. Positive and negative effects are also a function of a water body's intended use (fishing, swimming, aesthetics, or water supplies) and different uses are often mutually exclusive. Crystal clear waters, while desired for aesthetics and swimming, are poor for fin and shellfish production.

Whatever benefits nitrogen might have, however, it was regarded by environmentalists as the equivalent of arsenic during the debate over policies to control runoff into Barnegat Bay. The most vocal organization, Save the Bay, centered its attack on lawn fertilizers used by businesses and homeowners, but mostly was silent on reducing emissions from power plants located outside New Jersey.

After a noisy campaign by Save the Bay and the *Asbury Press* beginning in 2006, the New Jersey legislature passed a bill in 2010, signed into law by Gov. Chris Christie (R), that requires the use of slow-release lawn fertilizer. At the time, this was touted as a major step forward to ending much of the alleged nutrient pollution of the bay.

However, not only do environmentalists now claim that the real problem is the nitrogen coming down in rainfall as the result of the burning of coal for electric power plants, but they also are trying to take this campaign national. Yet, if one takes a hard look at the scientific research behind the naming of nitrogen as a major source of water pollution, it is clear that something is amiss — a disconnect between the actual results of the research and the rhetoric that accompanies it.

Simplifying ecology | As water bodies increase in energy and organic matter, they become more "productive" in a process called eutrophication. This increase in productivity generally is measured at the base of the aquatic food chain using some measure of algal production. Eutrophication can be positive, as when it results in increased fin and shellfish production, or nega-

tive when it causes an impairment of any water's designated use — such as depletion of dissolved oxygen or choking weed growth.

Eutrophication occurs for reasons often interrelated, including natural processes, increasing temperature or nutrients, changes in flushing and tidal characteristics, sunlight penetration, disease, silica deficiency, and changes in the population of grazing animals or those that feed on grazing animals. However, regulatory expediency has killed the inherent complexity of estuarine science. Because regulators and NGOs wanted to name nitrogen as a single "killer" substance, government policies were developed to interpret complex data as being simple. No longer would eutrophication be a natural event, or caused by disease-ravaged oysters, or by human modifications to inlets and wetlands; instead, all estuarine problems would result from one variable in order to yield maximum regulatory control. Yet, controlling nitrogen may well make Barnegat Bay's current problem worse.

Barnegat Bay could be at its lowest nitrogen level in the last 100 years. Unlike the Chesapeake, New Jersey removed all of its treated wastewater from the bay by 1980 and its poultry industry collapsed in the 1950s. Agricultural land draining to the bay is less than 10,000 acres, while agriculture and wastewater account for 75 percent of the nitrogen loading for more typical Northeast and Mid-Atlantic bays like the Chesapeake. Furthermore, because of improved catalytic converters and pollution control devices, the EPA estimates nitrogen from these sources has fallen by about 30 percent in the last few decades. Yet, to counter those facts, environmentalists and regulators simply claim that Barnegat is an example of extreme sensitivity to nitrogen, which will be used to justify further emission reductions.

However, researchers found a number of factors that contradict environmentalist claims about Barnegat Bay. Among them:

- The total nitrogen levels from surface water sources into the bay are below what the U.S. Geological Survey considers as natural national background (0.49 vs. 0.58 milligrams per liter) and below what the EPA uses as the reference condition for this region.
- The total nitrogen in the surface water is one-fourth to one-12th what the EPA considers acceptable. The agency's four-year-old report on the bay rated its algae condition and nitrogen levels as "good." (This report is being ignored to make way for the new nitrogen paradigm.)
- The nitrogen in the sediment is "typical of shallow lagoon estuaries," according to one recent study commissioned by the NJDEP.
- A USGS study (as well as two others) on the watershed found "no linear relation was apparent between the percent of land development" with either the surface water or groundwater nitrogen levels.
- The watershed has seen no major increase in the developed land over the last 100 years, simply a shift from higher-nitrogen-yielding agriculture development to lower-yielding urban uses.
- No calculations of the anthropogenic or natural nitrogen sources have been made.
- The nitrogen contribution from lawn fertilizer was calculated by a second-year law intern working for one of the NGOs. A Rutgers soil scientist who tried to warn that the fertilizer legislation may actually create more nutrient loadings was smeared for his efforts. Nationally, the USGS has found that lawn fertilizer accounts for just 1–2 percent of the total nitrogen load, or about a 10th of what is created by ethanol production.
- No long-term trend analysis correlating nitrogen and any of the described symptoms has been compiled.
- No study has been done to understand the amount of nitrogen that can be removed by the planned $100 million in storm water treatment spending.

In 2007, Lisa Jackson, who was then head of the New Jersey Department of Environmental Protection and now is head of the U.S. EPA, told media outlets that lawn fertilizers were causing pollution problems in Barnegat Bay. However, when she made her statements, the USGS and the NJDEP, in an interagency meeting, were given evidence that nitrogen was not harming the bay. Furthermore, the EPA in that same year gave Barnegat Bay a "good" rating, which upset one of the most vocal "nitrogen narrative" advocates, Michael Kennish, a research professor with Rutgers University who heads Barnegat Bay research at the Institute for Marine and Coastal Studies. Kennish and Jackson simply ignored the positive EPA report and increased the rhetoric. At the same time, they began to push a Total Maximum Daily Load program for nitrogen in Barnegat Bay similar to that of the Chesapeake Bay. (See "The Trouble with TMDLs," Spring 2001.) However, the watershed conditions for Barnegat are quite different than those of the Chesapeake and researchers have not even managed to show that the nutrient narrative fits that bay.

Conclusion

Despite research demonstrating that nitrogen nutrients are at historically low levels in Barnegat Bay, environmental groups and environmental regulators claim that lowering nitrogen levels is the bay's only salvation.

It is almost certain that the "tough new fertilizer law" in New Jersey will bring no measurable changes in Barnegat Bay water quality, and could even harm the bay. R

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