

The Barnstable Patriot

Three Bays Preservation: The science beyond the nitrogen crisis on Cape Cod

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Water quality throughout the Three Bays estuary has been on a dangerous trend, worsening slowly but methodically over time. Most of us don't notice, but ask old-timers about the days of clear blue water in August or sandy bottoms in our embayments covered in eelgrass, and let their nostalgic testimony remind you of what once was, and what has been taken from you.

You can argue the cause and effect of global warming, volcanoes, burning coal or sun spots, but you can't dispute the cause of excess nitrogen pollution. The problem is, we flush where we drink, swim, boat and fish. Nitrogen is not being recycled. The natural nitrogen cycle is broken, and we have broken it.

To begin to understand the nitrogen crisis, let me share a quick science lesson. First, inert nitrogen gas in our atmosphere is converted into a form usable and necessary for plants by micro-organisms in the soil. Animals (herbivores) eat the plants that contain this organic form of nitrogen and use it to make proteins. Other animals (carnivores) then consume animal protein, and as part of digestion and metabolic processes create a water-soluble organic nitrogen compound called urea. After excretion, the organic nitrogen in urea is converted back into inert nitrogen gas by similar micro-organisms in the soil and the process repeats itself. This is called the Nitrogen Cycle.

The Nitrogen Cycle is natural and necessary. However, when humans dispose of wastewater in septic systems, our urea bypasses any soil and micro-organisms. It is not recycled back into the atmosphere, but quickly and directly enters the groundwater. It is not given the opportunity to pass through nature's natural recycle factory, the soil.

Our septic systems are designed and built to be several feet below the organic layer where all natural metabolic activity occurs. This means our groundwater has higher levels of organic nitrogen (urea) than a natural or normal balanced ecosystem. As population densities increase, higher and higher amounts of nitrogen enter the system. In the Three Bays Watershed, we calculate that the equivalent of sixty 50-pound bags of lawn fertilizer enter our ponds, rivers and estuary every day. This is over 24,090 bags a year. There are over 6,250 households in the Three Bays Watershed and each person in it creates 25 to 30 grams of urea every day.

What's the difference between a medicine and a poison? The answer is dosage. The same is true for the difference between a fertilizer and a pollutant. A little is good and even necessary, but too much causes damage. The excess nitrogen leaving our septic systems is polluting our ponds, streams and saltwater estuaries. The excess nitrogen causes an imbalance in the ecosystem. Algae blooms in fresh and salt water bodies, jellyfish blooms, eelgrass decline, fish kills and oxygen depletion are all symptoms of the problem.

Our present methods of wastewater management must change. The status quo is not sustainable. We must modify every individual septic system in such a way that it removes or denitrifies the organic nitrogen before it enters the groundwater, or we must collect the wastewater and denitrify it on a municipal scale. Most people call this a municipal wastewater treatment plant, aka a sewer system. Barnstable already has one in a small part of town that is only 40 percent utilized. We probably need to do both.

The excess nitrogen pollution problem carries a significant cost. In March 2015 the Cape Cod Commission released the report "Water Quality and Cape Cod's Economic Future: Nitrogen Pollution's Economic Impact on Homes & Communities." This groundbreaking report contains sobering statistics: "...;High levels of nitrogen decreased a home's value, where a 1 percent decline in water quality led to an average loss in home value of 0.61 percent." Our water quality is

decreasing at a rate of about 1 percent per year and has been since the Three Bays Preservation has been keeping records. This means the homes we live in would be worth a lot more than they currently are if we had a wastewater management plan that worked.

I have said it before and it's worth repeating. We don't have a clean water problem. Clean water falls from the sky every day. We have a wastewater problem. Our wastewater is contaminating our clean water. We need a comprehensive wastewater management plan with an equitable means of paying for it. Citizens of Barnstable deserve clean water: it is a fundamental service a community provides for itself, second only to public security.

Please ask and insist that our town councilors and managers implement an effective Wastewater Management Plan.