



An aerial photograph of a sandy beach and turquoise ocean water. The water is a vibrant greenish-blue, and the sand is a light, textured beige. In the bottom left corner, a small boat is visible on the water. The overall scene is serene and idyllic.

The Cape's Big Drinking Water Problem

When you live on what's essentially a sandbar, pollution, septic systems, and political roadblocks add up to one tough challenge.

By Barbara Moran

ON AN OVERCAST JULY MORNING, Diane Carlson wades calf-deep into Cape Cod Bay to harvest her oysters, which grow 900 feet off the Brewster shore. She leans over a metal cage just revealed by the rapidly receding tide and flips open the lid. All chitchat ceases. "I have to count now," she says. "I can't talk when I'm counting."

Carlson counts out five dozen, scraping tiny baby mussels off the shells as she goes, piling the oysters in a plastic bucket. Behind her a blue-gray sky meets a gray horizon, which smudges into the gray-green water: a snapshot of Cape Cod idyll. What the Cape is, sometimes; what we long for it to be, always.

PHOTOGRAPH BY DAVID L. RYAN/GLOBE STAFF

Fifteen miles up Cape from Carlson's oyster farm, the scene merges to the urban face of Cape Cod—the town of Barnstable. Sightseeing boats and commercial fishing vessels, all winches and rust, and the hulking ferry to Martha's Vineyard crowd the harbor off the village of Hyannis. Tourists throng the promenade: teenagers snapping selfies, a mom pulling two toddlers in a wagon, a middle-aged couple clutching maps and bottled water.

Barnstable is the Cape's hub of transportation, commerce, and tourism, with a year-round population of just under 50,000 that swells to 150,000 in the summer. And in May, just before vacation season kicked into high gear, town officials said there was something wrong with the drinking water.

In some parts of Cape Cod, ground water travels a foot a day. Whatever gets dumped on the ground could contaminate water within a couple of weeks.

The previous week, the US Environmental Protection Agency had dramatically lowered its advisory levels for two chemical compounds—perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), once found in things like nonstick coatings and stain-resistant clothes, and still used in some industrial applications such as flame retardants—instantly putting water from the Hyannis Water System, one of three feeding into Barnstable, over the limit. Town officials recommended that pregnant women and nursing mothers in Hyannis not drink or cook with municipal water, nor should babies drink it, they said, noting that exposure to elevated levels of PFOA and PFOS might cause developmental problems. Daniel Santos, the Barnstable director of public works, de-

Diane Carlson
at Ebbwater
Sea Farm, her
Brewster oyster
farm



scribes the water supply as “under siege.”

Though the two Capes seem worlds apart—one populous and commercial, the other open and rustic—they face the same essential challenge: geology. All the drinking water on Cape Cod, except for one pond in Falmouth, comes from a single underground aquifer. And because most of the Cape is essentially a sandbar, anything spilled on the ground—gasoline, septic discharge, insect repellent—trickles through the sand and mingles with the ground water. Cape Cod has 560 miles of coastline, nearly 1,000 kettle-hole ponds, and one aquifer, all in jeopardy.

“It’s a constant balancing act here on the Cape, to protect what is so essential to why we all live here. It’s our coastal waters, our ponds and our ground water, our drinking water,” says Mark Ells, Barnstable’s town manager. “How often is it an issue for us? Every single day, in everything we do.”

BARNSTABLE’S MUNICIPAL WATER SYSTEM—if it can even be called a system—is typical of many Cape towns. It has one waste-water treatment plant serving most commercial buildings and some residences. But 80 to 85 percent of the homes, the same percentage as Cape Cod as a whole, treat waste water with septic systems buried in their yards. Residents buy drinking water from four different purveyors. Town government oversees only one of them—the Hyannis Water System—and fire districts oversee the rest. Capewide, about 85 percent of residents rely on town water and 15 percent use private wells. Unlike Boston and 60 other area communities, where the Massachusetts Water Resources Authority oversees the entire water supply, both coming and going, Cape Cod must manage its fragile ground-water system through a fractured jumble of entities.

“If you contrast it with Boston, they draw their water from the Quabbin, and they discharge through a pipe out to the ocean,” Mark Ells says when we meet at his office in Barnstable Town Hall in July. “Not here.”

Ells unrolls a large colored map on his desk. He points out three blue circles designating the drinking water wells, known as Mary Dunn 1, 2, and 3, that the town had temporarily closed due to the PFOS and PFOA contamination. (All three, named after a local folk hero, have since been reopened, and the health advisory was lifted in July.) Then he points to a firefighting academy and traces the direction of ground-water flow from the academy toward the wells. “Therein lies the problem,” he says. The town system has 11 wells, and Ells says he is seeking new sites for those that are most threatened. “I expect that will be one of the longer-term solutions.”

To better understand the short-term solutions, I ask Ells if I could visit one of the Mary Dunn wells. We drive a few miles down a Hyannis avenue laced with strip malls, gas stations, and nail salons, then turn onto a potholed country road, heavily forested on both sides. We pull up to a squat brick building next to two 10-foot-diameter, 20-foot-tall metal tanks—giant filters—and see Daniel Santos standing next to a red pickup truck. Santos, a civil engineer and ex-Navy Seabee who has spent his career in public works, walks me around the tanks and the wellhead. He explains that each tank contains 20,000 pounds of activated carbon to filter PFOS—“You ever have a fish tank at home? It’s basically the same thing.” The town has installed a two-tank filtration unit on each of its three contaminated wells at a cost of \$400,000 per well, including a one-year lease.

Ells heads back to work, and I climb into Santos’s pickup. We pull back onto the woody road. I tell him it feels as if we’re in the middle of nowhere. “But if you look at a map, you realize we’re not,” Santos says. “We’re by a fire academy, an airport, and an industrial park—and they’re all threats.”



geology. In some parts of Cape Cod, ground water travels a foot a day, and in many places the water table sits less than 10 feet below the surface. Whatever gets dumped on the ground could contaminate water within a couple of weeks.

Industry is not the only, or even the biggest, threat to Cape Cod's water. There's also storm runoff and excess fertilizer to worry about, household detergents, encroaching saltwater, spilled gasoline, and—the latest controversy—herbicides sprayed by Eversource to control vegetation under power lines. But the most widespread problem, by near-universal agreement, is septic discharge. This problem, like the others, is not unique to Cape Cod but is amplified by the region's hydrology and housing. Most homes rely on septic systems, where everything flushed down the toilet flows into a large tank, likely buried in the backyard. Solids settle to the bottom, a layer of scum floats to the top, and most of the liquid is left suspended in the middle. This liquid drips into a leach field near the tank, where it trickles slowly through the ground, hopefully diluted and digested by microorganisms in the soil.

Septic systems work best in rural areas, with houses spread far apart, and do a good job preventing solid waste and pathogens from entering the water supply. The problem: the liquid dribbling through the leach field. This liquid—mostly urine, as you would expect—contains nitrogen, phosphorus, and all the medications and toxins in your pee. The nitrogen and phosphorus endanger the environment—too much in ponds and estuaries spurs the overgrowth of algae and the mass die-off of fish. A recent example is the reeking blue-green algae bloom that oozed through Florida's St. Lucie River in July. The Cape has closed swimming ponds in the past for algae treatment but has never seen anything like the slime in Florida, at least not yet. "If we had suffered that kind of blue-green algae outbreak here, boom. The Cape Cod economy is a seasonal economy,"

Top (from left): Barnstable's director of public works, Daniel Santos, and Town Manager Mark Ellis at one of their carbon filters. Left: A sign warning of the effect of saltwater encroachment on drinking water at Wellfleet Town Hall in 1983.

THE FIRST WIDESPREAD REALIZATION of Cape Cod's water fragility came in the 1980s with the discovery that the Massachusetts Military Reservation, now Joint Base Cape Cod, was leaking plumes of toxic chemicals and heavy metals into the ground water. "There was some really scary stuff in the plumes," says Ed DeWitt, executive director of the Association to Preserve Cape Cod, an advocacy group focused on environmental issues. People started to realize, DeWitt says, that "when you put something in the ground, it doesn't stay in one place."

In parts of Massachusetts with clay or rocky soil, ground water can take a decade or more to travel a foot underground, depending on the

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Eastham health agent Jane Crowley at the shore of the town's Salt Pond, where storm runoff is spurring excessive algae growth



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says Paul Niedzwiecki, executive director of the Cape Cod Commission, the regional planning agency. “We could crater ourselves.”

As for the rest of the contaminants seeping through the sand, the health effects are largely unknown. The Silent Spring Institute, which researches links between environmental chemicals and health, studies the Cape Cod water supply. The group has found small amounts of antibiotics and statins in the Cape ground water, as well as nicotine metabolites, mood stabilizers, progesterone, artificial sweeteners, and other

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chemicals not usually associated with drinking water. Such “emerging contaminants” are a concern nationwide. Though the scientists detected only low to moderate amounts in many places on the Cape compared with national averages, the levels of PFOS, sulfamethoxazole (an antibiotic), and phenytoin (a seizure treatment) were among the highest seen outside of industrial contamination sites. Though even the highest levels of pharmaceuticals the scientists found were far lower than the amount in a typical dose of medication, their presence in drinking water is worrisome.

“I think what concerns me most is the mixture—that there’s not just one chemical, that we’re getting a mixture that we don’t really under-

stand,” says Julia Brody, executive director and senior scientist at the Silent Spring Institute. “And that’s a reason why federal guidelines may be inadequate, because they’re taking the chemicals one at a time, but that’s not how they show up in your glass of water.”

Luckily, there’s a solution, says Brody: “Keep the waste water away from the drinking water.”

This is difficult but not impossible. On the front end, citizens can use environmentally friendly detergents and stop flushing their excess medication down the toilet (many drugstores and police stations will collect them for free). On the other end, municipal waste-water plants—appropriate for some urban areas—treat water to lower nitrogen and phosphorus levels, tweak the acidity, and kill pathogens. Some newer, pricier septic systems can do the same. Adding a layer of sawdust to leach fields or digging them more shallowly so that more soil microbes can eat the waste may also reduce nitrogen, phosphorus, and emerging contaminants. Buried barriers can block excess nitrogen and phosphorus from ponds and coastlines. Other technologies like composting or “urine diversion” toilets could also help.

But issues with social acceptance—a composting toilet in the house? *Really?*—and a widespread sense of anti-government rugged individualism lead many Cape Codders to favor septic systems and private wells over anything reeking of Big Water. Oyster farmer Diane Carlson, for instance, draws drinking water from her private well, which she tests regularly. She says it just tastes cleaner. “I hate city water,” she says. “All I can taste is chlorine.”

“There was a person who ran for county commissioner a couple of years back whose whole campaign was ‘No MWRA for Cape Cod,’” recalls Ed DeWitt. “So there’s this basic distrust of government.” There is also, he says, the ever-looming question of cost. And here progress has collided with the only force stronger and slower than the glacier that carved Cape Cod: the New England town meeting.



FOURTEEN OF THE 15 towns on Cape Cod, like many in New England, pass laws via town meeting (Barnstable has an elected town council). Laws that incur debt require a two-thirds majority vote, and Big Water costs Big Money. “To sewer everybody on the Cape, we’re talking about a six to eight billion-dollar price tag,” says the Cape Cod Commission’s Paul Niedzwiecki. In contrast, after installation, drinking water from a private well is essentially “free,” as is disposal through septic tanks, meaning there’s no monthly utility bill. (Yes, you’re supposed to pump the solids out every two years, but many people don’t, says Niedzwiecki.) The cost comes when someone buys or sells a house and must replace faulty systems.

So, faced with big costs at town meeting, year-round Cape residents, who on average have incomes below the state’s median, historically have voted down most water management plans. In Eastham, for instance, where every lot has a private well, voters shot down a municipal drinking water plan more than five times before finally approving a treatment system in May 2014. “People stopped, applauded. It got to be very emotional,” says Eastham health agent Jane Crowley. “It was a long, hard fight.” What finally tipped voters, she says, was probably the discovery in 2012 that 1,4-dioxane, a likely human carcinogen, had leaked from the closed Eastham landfill and showed up in trace amounts in the elementary school’s water supply. The town still supplies bottled water to schoolchildren and to about 40 households with contaminated wells. The \$140 million public water system, more than a year in construction, will go online in the fall.

Niedzwiecki had his own town meeting moment in 2011, when he watched Yarmouth’s proposed waste-water management plan go down in flames. “It was just a food fight,” he recalls. “So I came out of there and said, ‘We have to be able to have a better conversation.’”

When a 2012 federal lawsuit spurred the renewal of the Clean Water Act’s section 208, which calls for regional waste-water planning, Niedzwiecki saw an opportunity. Over the last three years, he has gathered developers, citizens, environmental groups, and elected officials to talk about water, what he calls “the least sexy issue in public policy.” The “208 process,” as everyone calls it, seems to have galvanized and organized citizens—“I think it has gotten us moving,” says water advocate Ed DeWitt—and towns are beginning to implement their individualized plans. Eastham, with the drinking water issue squared away, now has waste water in its sights.

Crowley’s next mission: Salt Pond, an estuary abutting the Cape Cod National Seashore, where nitrogen from septic sys-

tems, storm runoff, and other sources is spawning excessive algae growth. Scientists began measuring water quality in the pond in 2001, and it has been “significantly declining,” says Crowley. “There’s a huge outfall pipe. Huge. And it collects from a great distance. And it dumps into the pond, without any pretreatment,” she says. “It’s not the only source of the problem, but it’s a controllable source.”

Crowley suggests I visit Salt Pond, so I drive a few hundred yards to the boat landing. The pond appears all picturesque Cape Coddiness, with a Kelly green rowboat bobbing in the water near stands of gently swaying marsh grass. I look for the outfall pipe and can’t find it, but I note the results: Mats of webby green algae mar the shoreline, a rotting smell hangs in the humid air. The rumble of traffic from Route 6 overwhelms the sounds of birds and lapping waves. A motorcycle sputters past, then a tanker truck shifting gear. A tourist pulls into the parking lot, snaps a photo of the green rowboat, and drives away.

I begin walking to the far side of the pond, over a path of crushed shells and flattened grass. Around a bend, the view expands, the pond opening into a channel. It is the Cape of childhood memories, the Cape of our imaginings. The roar of traffic falls away. The sky brightens, the breeze rises and ruffles the trees, a caravan of canoes paddles by. I stand there for a long moment and see the Cape Cod we all want to see. ■

Barbara Moran is a science writer based in Brookline. Send comments to magazine@globe.com.