

across all income groups. Regardless of income, Rathje found, everyone on average gets the same buzz on.

ONE DAY, after some sixteen years of trash sorting and household consumer surveys, Rathje and a colleague were discussing the Garbage Project's latest findings. The other archaeologist heartily congratulated Rathje for all the fine work, but then made a pithy observation. "That's great and all, but where's the dirt, Bill? If there's no dirt, it's not archaeology."

Rathje was brought up short by this. His colleague was right: Archaeologists dig. If they wanted to do real archaeology, garbologists would have to dig, too. Why hadn't he thought of this before? It was time to stop bringing the garbage home, and start bringing their project to the garbage.

Thus began years of plumbing the depths of landfills—twenty-one of them, all over the country, more than 130 tons pulled up by the bucket augur before Rathje finally called it quits after more than thirty years as the world's leading garbologist.

The single most startling finding from Rathje's excavations was that garbage does not decompose inside landfills as most people, including sanitation experts, believed. A well-maintained, airtight, dry sanitary landfill was more like a mummifier of trash than a decomposer of trash, Rathje found. Fifty-year-old newspaper was intact and readable, headlines about President Truman's electoral chances still bold and black on the front page. Steaks and hot dogs came up intact after decades. (But kaiser rolls? Not so much: Exhumed, they looked remarkably like ancient, mossy granite grinding disks used to make prehistoric cornmeal. Then Rathje spotted the poppy seeds and realized he had not fallen through some weird trash time warp that put Stone Age tools in the same landfill stra-

tum as bottle caps and an exhausted tube of hemorrhoid cream.) Landfills, the Garbage Project diggers proved, were in many ways like giant time capsules, preserving for decades the seemingly perishable items we expected would turn to organic mush, while other items very, very slowly decomposed. There's enough decomposition to generate a steady flow of methane, but at a slow enough rate that organic waste remains recognizable for a long time—grass clippings still green after fifteen years, onion peels and carrot tops hanging in there after twenty—which means that the methane flow can continue for a very long time, too.

According to Rathje, these findings, while unsettling to the orthodoxy, are a good thing. It means some of the potentially toxic juices people feared would leach out of landfills are basically just sitting there. This stability had long been recognized as the silver lining of plastic trash that we fail to recycle—it didn't decompose, and so posed no environmental hazard as long as it was contained in a landfill. On the other hand, the materials that people had hoped would biodegrade—even the stuff officially designated as (or specifically designed to be) biodegradable—didn't break down as expected in landfills, either.

There was a bad-news, good-news finding on hazardous waste in municipal landfills, too. The bad news: There was a lot more of it than anyone had believed. There were twice as many cans of bug spray, containers of paint and old drain-cleaner cans being slipped into trash bins and spirited off to landfills as had been believed. The good news: Like so much other stuff in the landfill, it mostly just sat there. Even when the containers leaked or broke, the surrounding "trash matrix" soaked it up like a sponge and retained it. And a little more bad news: When there was a problem of landfill contamination leaking out into the real world, particularly after floods,

this presence of chemical hazards could make residential trash just as toxic as industrial waste.

The other dramatic finding from the landfill excavations, one that shocked even the jaded garbage sorters from Tucson who thought they had seen it all, was the amount of food waste dumped in landfills. As much as 17 percent of the garbage by weight that they were hauling up in the late 1990s and early 2000s consisted of food waste. Some of it was truly waste—coffee grounds, eggshells, plate-scraping slop—but nearly equal portions were completely edible, from expired hamburger to potato peels (a major and completely edible weight component of food waste) to those specialty breads such as those deceptive kaiser rolls, which ended up landfilled at far greater rates than standard loaves of bread, which were practically no-shows. Indeed, that finding led to the Garbage Project's "First Principle of Food Waste":

The more repetitive your diet—the more you eat the same things day after day—the less food you waste.

This principle upsets quite a few people and special interests, Rathje soon discovered. Nutritionists want a healthy variety. Food companies live and die by novelty, constantly introducing new breakfast cereal variations and reformulated baked goods and new flavors of processed food. But novelty (which consumers think they want more than they *actually* want it) breeds waste—those darn kaiser rolls, along with hot dog buns and biscuits and English muffins, end up getting thrown out anywhere from 30 to 60 percent of the time. Novelty may make for effective marketing, but in terms of waste, it's a disaster.

America's propensity for throwing away perfectly good food that could quite literally end hunger for millions of people has received considerable attention (if not reform) recently, but the Garbage

Project was calling attention to food waste as a vital issue fifteen years ahead of the curve.

"We just thought it was appalling," Rathje recalled. "And most people are oblivious to it. If you ask them, they'll tell you they are careful not to waste food. But as usual, their garbage tells a different story. It was typical for the households we looked at to waste 15 percent of the food they bought."

A number of landfill excavations were made through contracts with cities that needed better insight into their trash. Unearthing garbage in Phoenix, the researchers were able to determine the amount of recyclables that were being buried. Aluminum cans alone could net the city more than \$6 million a year if captured, recycled and sold at market rates. The city public works department used Rathje's analysis to pry \$12 million from the Phoenix city council to launch a new recycling program for the Arizona capital.

After the Garbage Project informed the city of Toronto that construction waste was clogging a fifth of their available landfill space, the city invested in the infrastructure necessary to recycle concrete, bricks and other demolition and construction debris. Excavations of four landfills in Toronto also validated the city's recycling program, one of the oldest in North America, which was under fire for costs. Rathje and his crew proved it was biting deeply into the waste stream and, if anything, had surpassed expectations. And in Mexico, the government adjusted its import taxes in favor of a bit of protectionism when the Garbage Project found that luxury goods purchased in Mexico City's affluent neighborhoods tended to be American-made.

RATHJE MADE an estimate a few years back that suggested all of the garbage produced by the United States for the next thousand

years could fit inside a single landfill—as long as said landfill stretched across forty-four square miles and rose 120 feet high.

That sounds huge, but not as huge as most people think all the country's trash should be. Such a landfill (less than a quarter the height of Puente Hills) would cover all of the Bronx, or a mere one-fifth of the West Coast's main Marine Corps base, Camp Pendleton, or just .036 percent of the land area of the state of New Mexico. More square miles of that state's national forests have burned in a single fire season than such a landfill would cover in a thousand years. In other words, a thousand-year landfill would be big, sure, but not really all *that* big. No one is proposing such a mega-dump. The point is, Rathje liked to say, we have plenty of room to keep burying our trash until we find a better plan. Space for trash, in other words, is not the problem.

Of far greater concern, as Rathje saw it, is the trash that *doesn't* get into the landfill vault—the debris in the gulches, the plastics in the ocean, the waste that drifts off into rivers and streams. And the biggest system flaw of all, he argued, is the disposable, wasteful mind-set that creates the flow of trash in the first place. Rather than a problem specific to landfills or other sanitation strategies, Rathje always maintained, this is a flaw in how manufacturers create and consumers use disposable products.

Rathje retired from the garbology business in his early sixties and spent the last years of his life devoted to Buddhism and his passion for photography, illustrating Buddhist texts with his photos of nature. In what would be his last interview, Rathje shared his thoughts about the state of garbage in America for *Garbology*. He died of natural causes a few months later in May 2011, at age sixty-six.

He confessed to being more than a little disappointed that the

Garbage Project's heroic efforts to clear up mysteries and misunderstandings about waste have had so little impact in terms of changing the world of trash. We still waste colossal amounts of food—the EPA pegs food waste in landfills as more than 14 percent of total landfill contents by weight. This isn't much different from what Rathje found more than a decade ago, despite recent attempts to ramp up composting nationwide. Food waste aside, most recyclable materials are not, in fact, recycled. It's frustrating, Rathje said. The problem as he saw it is in how people define the very concept of waste, a question that he said was really more philosophical than scientific.

In modern garbage parlance, Rathje explained, "waste" has become synonymous with "trash"—that is, waste has come to mean the perceived dirty, icky, unhealthful, useless, valueless material that's left over when we're done with something. By this definition, waste is the foul stuff we wish would just disappear. Our entire elaborate waste collection, transportation and disposal system has for a century been built around this "just make it go away" concept, an illusion for which Americans happily (or at least regularly) pay either through taxes or monthly bills. Waste in this sort of discussion is always defined as a cost, a negative and a burden—an inevitable, unpleasant fact of life, for which the only remedy is removal.

But what happens if a different definition of the word "waste" is emphasized—the original verb form of the word, as in "to waste" something? Now the nature of the debate changes, because "to waste" implies the object being wasted has value, be it time, resources or manpower. After all, you can't waste something devoid of value. If trash is defined not as waste but as the physical manifestation of wastefulness, the discussion stops being about disposing of

the dirty or useless, and starts being about asking why we are throwing away so much hard-earned money. Why are we wasting stuff that we pay for as product or packaging, then pay for again as trash to be hauled away? Now it's no longer the waste itself that's negative, but the act of creating it that's at issue. And the convenience of burying these discarded items in landfills forever, or shipping them off to China to be recycled for pennies on the dollar (or far less), stops seeming so normal, so sensible.

Rathje used an archaeological analogy to express this distinction between waste and wastefulness. Boiled down to the most simple, broad categories, every great civilization goes through three main stages of evolution. First comes the pre-classic era, the Florescent Period, when a set of small, scrappy villages coalesces into something more powerful, a dramatically rising civilization that has learned how to make a living, be it through warfare, trade, irrigation or some other method of consolidating and capitalizing on resources. Then, having reached a pinnacle of development, the civilization enters its Classical Period, in which it enjoys prosperity, steady growth and dominance. The Classic Maya culture that Rathje studied early in his career featured enormous temples and palaces sprawling across acres of verdant land—classical displays that required enormous resources and manpower to erect. A culture at that stage can afford extravagance. It can be—or at least believes itself to be—unharmful by waste.

Eventually, either through competition from other cultures or simple exhaustion of available resources, a civilization—any civilization—enters an inevitable decline. This is the post-classic or Decadent Period. In ancient Maya, the temples of the decadent years became small, the palaces shrunk, the once treasure-laden tombs grew spartan and poorly constructed. Cultures entering this

terminal phase begin husbanding resources, recycling and repurposing like mad. This is the moment when conservation becomes the watchword.

But the word always comes too late. Cultures replace extravagance with frugality only after the resources have dried up. Think Easter Island, the fall of Rome, and any number of empires, from Persian to Ottoman to Spanish to British. Always, the fall approaches and the wising-up comes too late.

One of the questions the Garbage Project sought to answer as it peered in the landfill mirror arose from that tragic history. What stage, Rathje asked, was American civilization in?

Back in 2001, when Rathje penned an article on this subject for the surprisingly readable *MSW Management: The Journal for Municipal Solid Waste Professionals*, the answer seemed obvious. The conspicuous consumption, the outrageous levels of waste, the paltry recycling rates, the popularity of sport-utility vehicles, the morbid obesity, the addiction to overpriced bottled water marked up thousands of times over its chemically identical tap water equivalent—all suggested an America in the midst of a most profligate Classical Period, embracing the culture of abundance, the illusion of the bottomless well. The headline on his column was "Decadence Now!" In it Rathje urged what seemed at the time to be a premature embrace of the values of a decadent culture. America should break the historical pattern and commit to all-out conservation and husbanding of resources before, rather than after, it was too late. Time to swap those definitions of waste and wastefulness, Rathje suggested, and hard as it might be, start thinking about what happens during a product's end life before we even buy the damn thing. The heedless wastefulness that has been an American hallmark since the birth of the disposable economy has to come to an end, he argued. That

would require an act of will, not unlike the decision by alcoholics or addicts to resist their insatiable cravings. "That doesn't come easy, but that's what it takes," Rathje declared. "Decadence now!"

There's just one problem, he added: No great civilization of the past has ever pulled this off. None.

"Can we make a conscious, unprecedented decision to embrace the frugality—the source reduction, reuse and recycling—of the Decadent Period before it's too late, while we're still riding high in the Classic Period?" Rathje wrote. "Will we thereby extend our golden days?"

He wrote that column eight months before the 9/11 attacks. In the decade that followed, judging by the recession-induced shrinking of trash loads heading to landfills, and the burgeoning interest in sustainability, recycling and zero-waste strategies in communities and businesses across the country, it seemed clear to Rathje that we are right on the cusp of our own Decadent Period. Perhaps we've already slipped over into it, he mused, or perhaps we'll pull back. But that drop-off is coming up sooner or later, Rathje predicted, and probably sooner than anyone is quite ready to believe.

"Decadence now!" he said at the close of the interview, then added darkly, "Now or never."

ALTHOUGH RATHJE'S Garbage Project ended with his retirement, with no one in the university research world interested in assuming his place as archaeologist of trash, his garbology legacy nevertheless continues. And it is doing so with a decidedly more hopeful spin.

The renaissance comes in the person of Sheli Smith, one of the first students to take part in the Garbage Project—a Moldy Oldy, as the veteran alumni of trash call themselves. It had been Smith who

stumped a game show panel that couldn't guess she was a garbologist, who silk-screened the project members' first official T-shirts (emblazoned with the image of a hand reaching inside a garbage can), who braved the derision back when Rathje's colleagues considered him crazed and embarrassing, and when they all referred to the project as *Le Projet du Garbage*. Even picking through trash sounds more dignified in French, she says.

After graduating from the University of Arizona in 1976, Smith went on to specialize in underwater archaeology. This took her as far from the desert trash sorting scene in Tucson as can be imagined, as she plumbed sunken cityscapes in the Mediterranean and shipwrecks in the Caribbean. But her work at the Columbus-based Past Foundation finally brought her full circle three decades later, when the head of the local Solid Waste Authority had sought the help of foundation anthropologists. He wanted to design an educational program that could help kids understand and rethink the way society creates waste. He had no idea he had stumbled on a founding member of the Garbage Project—he had never even heard of it when he asked if anyone there knew something about waste. Smith had given him a big grin and said, "Funny you should ask . . ."

Smith led the ensuing effort to create a school syllabus for an interdisciplinary garbology class project. It started as a public school pilot with one hundred high school students. They studied their own trash, their cafeteria food waste, the history of garbage, and wound up the class with an insider's tour of the local landfill. The students ended up fascinated and engaged by the hands-on excursion into a world of trash they never really considered before—it had been "in sight, out of mind," as Rathje liked to say. The students were also horrified by this world, as when they calculated that their little school cafeteria wasted sixty-five pounds of

perfectly edible food every day. Then they calculated it would take twenty household composters to handle that load.

"They were stunned. It changed their behavior," Smith says. "They stopped wasting so much food. They demanded the school stop wasting so much."

Based on this success, the garbology program was expanded, reaching first the entire school district, then much of the state's schools. Now it's gone viral. The curriculum, available as a free download, is being picked up for use in classrooms all over the country—adopted, modified, localized. The thing about garbology at that level, Smith says, is that it lets anyone—kids, teachers, parents—understand their own footprint, as well as their friends'. And once that's understood, it's possible to do something about it. Garbology makes it possible for a student to go beyond thinking about saving the world, and actually doing it, Smith says. It's within their power to make a difference.

High school students took it on themselves to renegotiate recycling deals, bringing in more money for their school after they studied their trash flow and calculated the value of their cans, paper and bottles. Third-graders voted to impose a twenty-minute rule of silence at mealtime—because if they concentrated on eating instead of talking, there would be less waste.

"Third-graders did that—it was *their* idea!" Smith says with wonder. "If I had suggested that, they'd think I was some crazy old lady. This is what Bill Rathje made possible. This started with him, and it's still making a difference. It gives you hope for the future."

PART
3

THE WAY BACK

If it can't be reduced, reused, repaired, rebuilt, refurbished, refinished, resold, recycled or composted, then it should be restricted, redesigned or removed from production.

—BERKELEY ECOLOGY CENTER

What the hell was I thinking?

—BEA JOHNSON,
on her pre-zero waste lifestyle

The people who are crazy enough to think they can change the world are the ones who do.

—STEVE JOBS