

FUTURE OF FOOD

# One-Third of Food Is Lost or Wasted: What Can Be Done

By **Elizabeth Royte**, National Geographic

It's lettuce season in the Salinas Valley, a carrot-shaped lowland in the central California region that produces about 70 percent of the leafy greens sold in U.S. retail markets. On a typically foggy morning, tractor trailers stuffed with salad stream from valley processing plants to points north, south, and east.

Meanwhile, a single roll-off truck trundles into the Sun Street Transfer Station, not far from downtown Salinas. The driver pauses atop a scale, then positions his battered Dumpster over a concrete pad. A flick of a lever, a pneumatic whoosh, and 20 cubic yards of lettuce and spinach tumble onto the ground. Packaged in plastic boxes and bags, the greens—piled seven feet high—appear to be in the pink of health: dewy, crisp, and unblemished. The misdemeanor for

which they'll soon be consigned to a landfill? Their containers have been improperly filled, labeled, sealed, or cut.

Anyone would say this heap—the size of two African elephants—represents a tremendous, even criminal, waste. But this is nothing. Over the course of the day, the transfer station will receive another 10 to 20 loads of perfectly edible vegetables originating from nearby grower-packers. Between April and November, the Salinas Valley Solid Waste Authority landfills between four and eight million pounds of vegetables fresh from the fields. And that's just one transfer station out of the many that serve California's agricultural valleys.

The Food and Agriculture Organization (FAO) of the United Nations, which keeps tabs on what's grown and eaten around the globe, estimates that one-third of food produced for human consumption worldwide is annually lost or wasted along the chain that stretches from farms to processing plants, marketplaces, retailers, food-service operations, and our collective kitchens.

At 2.8 trillion pounds, that's enough sustenance to feed three billion people. In the United States, the waste is even more egregious: More than 30 percent of our food, valued at \$162 billion annually, isn't eaten. Pile all that food on a football field and the layers would form a putrefying casserole miles high.

## What's Behind the Waste?

Careful readers may wonder: What's the difference between food loss and food waste? *Waste* occurs toward the back end of the food chain, at the retail and consumer level. In general, the richer the nation, the higher its per capita rate of waste. *Loss*, on the other hand,

mostly occurs at the front of the food chain—during production, postharvest, and processing—and it's far less prevalent in industrialized nations than in the developing world, which tends to lack the infrastructure to deliver all of its food, in decent shape, to consumers eager to eat it.

Take Africa, for example. Without adequate storage facilities and transportation, 10 to 20 percent of the continent's sub-Saharan grain succumbs to enemies such as mold, insects, and rodents. That's four billion dollars' worth of food, enough to nourish 48 million people for a year. In the absence of refrigeration, dairy products sour and fish ooze. Without the capacity to pickle, can, dry, or bottle foods, surpluses of perishables like okra, mangoes, and cabbage can't be converted into shelf-stable foods. Bad road and rail conditions slow tomatoes' trek from farm to market, poorly packed fruit gets jostled into mush, vegetables wilt and rot for lack of shade and cooling. Facing similar challenges, India loses an estimated 35 to 40 percent of its fruits and vegetables.

In developed nations, hyperefficient farming practices, plenty of refrigeration, and top-notch transportation, storage, and communications ensure that most of the food we grow makes it to the retail level (the piles at the Sun Street Transfer Station notwithstanding). But things go rapidly south from there. According to the FAO, industrialized nations waste 1.5 trillion pounds of food a year, an amount almost equal to the entire net food production of sub-Saharan Africa.

Calories are wasted at restaurants that serve overly large portions or fashion elaborate buffets—where diners help themselves to excessive portions and employees dump everything at closing

time, even if it's been under the sneeze guard for only five minutes.

Though they do their best to hide it from public view, American food retailers typically experience in-store losses of 43 billion pounds of food a year. Store managers routinely overorder, for fear of running out of a particular product, losing customers, and consequently, their jobs. Entire shelves of perfectly edible shell peas are transferred into Dumpsters to make room for incoming ones; pallets of zucchini are rejected because they curve too much. If the affected wholesaler can't quickly find another market nearby (a discount chain that tolerates curvy vegetables, for example, or a food bank with refrigerated space), the load will be dumped. The British supermarket chain Tesco, which publicly committed to reducing waste in recent years, still admitted to throwing out more than 110 million pounds of food within their U.K. stores during the latest fiscal year.

Consumers are also complicit: We overbuy because relatively cheap and seductively packaged food is available at nearly every turn. We store food improperly; we take "use by" dates literally, though such stamps were designed to communicate peak freshness and have nothing to do with food safety. We forget to eat our leftovers, we leave our doggy bags in restaurants, and we suffer little or no consequence for scraping edible food into a bin.

## **Squandered Resources**

No matter where waste occurs, it represents a lost opportunity to feed people. And, on the home front, it's costing us plenty: An American family of four trashes an average \$1,484 worth of edible food a year. Squandering food also squanders the vast quantities of fuel, agricultural chemicals, water, land, and labor needed to produce

it. According to Jonathan Bloom, author of *American Wasteland*, the production of uneaten food in the U.S. gobbles 70 times the amount of oil lost in the *Deepwater Horizon* disaster. Globally, it guzzles the annual flow of the Volga, Europe's longest river.

In 2007 a collective 3.5 billion acres of land, an area significantly larger than Canada, was plowed to grow food—or to support livestock and dairy production—that no one would eat. To compound the environmental insult, food buried in the airless confines of dumps generates methane, a greenhouse gas far more potent than carbon dioxide. If global food waste were a country, it would be the third largest generator of greenhouse gases in the world behind China and the United States.

Eating the food we produce seems like a no-brainer—a prerequisite of a sustainable food system. But hard-nosed economics thwarts simple fixes. It's no secret that the more yogurt consumers toss after reading its "use by" date, the more yogurt retailers can sell. For supermarkets, it may make more sense to tip surplus apples into Dumpsters than to lower their price, which would undercut sales of full-priced apples. Loath to come up short on supermarket contracts, big commercial growers typically overplant by 10 percent.

Farmers will also leave entire blocks of fruit or vegetables in orchards and fields for fear of flooding the market and depressing prices. Sometimes the cost of labor to harvest a crop exceeds the value of selling it: Known as a walk by, the acreage is plowed under. Yes, superior technology moves ever more food to market, but the resulting abundance—which keeps food prices low—only encourages more waste. As one Virginia farmer told me, gazing over 60 acres of broccoli he planned to disk under, "Even if I could get all this food to

market, do you think there are enough mouths to eat it before it starts to rot?"

## Fixing the Food Chain

If there's anything good about the shocking scale of global food waste, it's the huge number of opportunities it presents for improvement. In developing nations, for example, aid organizations are providing small-scale farmers with storage bins and multilayer grain sacks, tools for drying and preserving vegetables and fruits, and low-tech equipment for cooling and packing produce—with losses shrinking, in the example of tomatoes in Afghanistan, from 50 percent to 5 percent.

Farmers are also learning how to cure or pack their harvest for longer storage. "The farmers we work with in East Africa haven't historically had a surplus—they ate everything they grew within three months," said Stephanie Hanson, senior vice president of policy and partnerships for the Africa-based [One Acre Fund](#). "Now that they're able to grow more food, they need to learn new storage practices."

After the FAO gave 18,000 small metal silos to farmers in Afghanistan, loss of cereal grains and grain legumes dropped from 15 to 20 percent to less than 2 percent. Storing grain also potentially allows farmers to sell crops for two or three times the price at harvest, when markets are saturated.

In the U.S., scrutiny of food waste from the media, government agencies, and environmental groups has pushed a growing number of restaurants to start measuring what they toss, a crucial first step in curtailing loss. Dismayed by the amount of food their customers waste, TGI Friday's now offers smaller portions. By removing trays

from their cafeterias, scores of U.S. colleges have cut by 25 to 30 percent the amount of food that students take, and waste. Overseas, some restaurants have even experimented with banning diners for leaving food on their plate or charging them extra.

Farther up the food chain, orchardists are working with juice companies and packers to develop more secondary markets for less-than-perfect fruit. Engineers at Georgia Tech's Integrated Food Chain Center have devised sensors to be placed on produce in the field, in the hopes that knowing their strawberries' temperature, humidity, and travel history will help store managers better track and promote this perishable stock.

Innovation is saving eggs too. For years, Walmart found it expedient to dump an entire carton of eggs if one was cracked, rather than replacing the egg with one of equal freshness. Now the company is launching a pilot program that uses a laser system to etch individual eggs with product information, enabling workers to easily sub in a new egg with the same specs. If adopted across the nation, Walmart suggests the system could save roughly five billion eggs a year from premature scramble.

There are other systemic fixes on the horizon. The Natural Resources Defense Council is urging the U.S. government to standardize the confusing jumble of "sell by," "best by," and "use by" dates, which leads to unnecessary refrigerator purges. And scholars and academics are lobbying schools to resurrect home economics classes, which could teach our youngest consumers to embrace oddly shaped produce, store food properly, preserve surpluses, request smaller portions in restaurants, eat leftovers, share food they can't eat (often with the help of apps and social media websites), and

compost everything that remains.

In the U.K., where government has made food waste reduction a national priority, a grassroots group called Feeding the 5000 collects high-quality produce from farms and packers that has been rejected by supermarkets and cooks it into elaborate lunches served to 5,000 lucky diners, for free, in the name of raising awareness and celebrating creative solutions.

Tristram Stuart, author of Waste: Uncovering the Global Food Scandal and founder of Feeding the 5000, has called for groceries to discount goods close to expiration and to fairly share the cost of their overordering with suppliers, and for processors and retailers to publicly divulge their food waste tonnages. Rising to these challenges, Tesco has shrunk its arrays of breads, removed "display until" dates from fruits and vegetables, hung its bananas in protective hammocks, and started buying more fruit directly from growers, which lengthens its shelf life.

More recently, Stuart launched the Pig Idea, which is pressing the EU government to lift its ban on feeding food waste to swine, enacted following a 2001 British outbreak of foot-and-mouth disease linked with pigs eating uncooked scraps. Stuart, who is also a National Geographic emerging explorer, argues that collecting and sterilizing commercial food waste would lower feed costs for farmers, protect vast swaths of tropical forests from being cleared to grow soy for swine meal, and save businesses the cost of food waste disposal. Feeding livestock on the food we currently waste, according to the United Nations Environment Programme, would globally liberate enough cereals to feed three billion people.

**More Food on the Table**

Feeding our excess to animals makes good economic and environmental sense. But the best use for superfluous food is, of course, feeding the hungry, who globally number 805 million. In the U.S., 49 million people are officially food insecure: They don't always know where their next meal is coming from.

To address this need, the charity Feeding America expects in 2014 to distribute around four billion pounds of food, most of it donated by manufacturers, supermarkets, large growers, and the federal government. At the grassroots level, gangs of Boy Scouts, Future Farmers of America, and church groups organized by the Society of St. Andrew inch through the nation's farm fields, gleaning more than 20 million pounds of produce a year for food pantries and kitchens. And on some large California farms, field laborers pack ideal produce into one box, bound for the market, and cosmetically challenged produce into another, bound for food banks, in an innovative approach called "concurrent picking." Still, says Ron Clark, a produce broker who pioneered this program in the Salinas Valley, the food that's recovered by this process is just a drop in the bucket, with exponentially more left behind.

The first step in reducing food waste and food loss is getting people to perceive that there is a problem. Denial reigns supreme. But attitudes are slowly changing as the price of food rises, and as we become more aware of both the myriad ways that climate change will lower food production and the imperative to sustainably coax ever more calories from land already under cultivation.

Having too much food sounds like a wonderful, First World sort of problem. But filling cornucopias with an abundance that no one is even expected to eat is no longer something the world can abide. It's

too expensive, and it's trashing the planet while millions go hungry. "Food waste is a stupid problem," Nick Nuttall, of the UN Environment Programme, acknowledges. "But people love stupid problems because they know they can do something about it."

*Elizabeth Royte wrote about [freshwater conservation](#) in the April 2010 issue of National Geographic magazine and is the author of [Garbage Land: On the Secret Trail of Trash](#).*

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*Correction: An earlier version of this story misstated that a volunteer was packing food in Lisbon, Spain. She is in Lisbon, Portugal.*