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THE PERFECT STORM
A history of food waste

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Saving food and preventing waste are crucial matters that have confronted humankind for millennia. Failure to store or preserve food in times of plenty could result in hunger, famine, and death in times of want. Virtually every religion forbade wasting food, and saving food was a value built into the culture of communities around the world (see Chapter 3 in this book). Family culinary traditions, often passed down from mother to daughter, stressed the importance of wasting nothing and finding uses for every bit of edible food (see Broomfield 2007 for Victorian history and food preservation). Cookery manuscripts and later cookbooks offered adaptations of traditional uses to prevent waste, and recipes for leftovers. Notable examples of such a cookbook, identified by Evans et al. (2012), are Isabella Beeton’s *Book of Household Management* (1861) and *Mrs Beeton’s Cookery Book* (1899). Vegetable peel, bones, and less desirable animal products were used to make stocks and soups, or fed to livestock. Roots, leaves, feathers, bones, fish scales, and spoiled food were composted for use as fertilizer (Wilson 1991).

Beyond household culinary traditions of using peel and bones, food processors also contributed to food waste prevention. Some food processors considered by-products from processing as resources rather than waste (Bruttini 1923) and this perspective was exemplified by Chicago meatpacker Philip Armour. Armour hired chemists to exploit the inedible parts of cattle and hog carcasses. He noted that the goal of a slaughter facility, for instance, was to convert every part of the animal into a saleable product. This meant that the “waste” and leftovers from slaughter were transformed into gelatin, soap, glue, glycerin, grease, and fertilizer. Armour declared that waste was criminal and when asked which parts of the pig he used in his packing plants, he reputedly shot back, “Everything but the squeal” (Leech and Carroll 1938).

Reducing food waste continued as a concern among food processors throughout the twentieth century (Spooner 1918; Bruttini 1923; Benedict and Farr 1931). However, the issue received wider public attention mainly in periods of shortages and rationing, such as during the First and Second World Wars. Governments of nations affected by war launched propaganda campaigns, with newspaper articles, posters, and radio programs encouraging citizens not to waste food, which was desperately needed to support the war effort. War was declared on food waste (Harrison 1918) with messages equating the wasting of food to a lack of morality. Wasting food was declared a “sin,” while preventing food waste was
patriotic. Numerous slogans such as “Waste Not, Want Not,” “Waste of Food Helps the Enemy Greatly,” and “Save the Food of the Nation” were printed on flyers and posters, and pamphlets promised that “Food Will Win the War!” (Chambers and Mamburg 1918). When the wars were over, the anti-food waste campaigns ended.

**Contributors to food waste**

Throughout the twentieth century, food prices declined as mechanization increased crop yields, improved freight transportation, and fostered the rise of supermarkets. Simultaneous with the decrease in food prices was the increase in wages for many urban workers. The result of lower food costs and higher take-home pay was that families spent a smaller proportion of their income on food. In 1901, US urban households spent an estimated 42.5 percent of their take-home pay on food. By the twenty-first century, this had dropped to about 6.6 percent for food consumed at home (Bureau of Labor Statistics 2006; Sturm and An 2014). Similar patterns were seen in other affluent countries: By the twentieth-first century, UK households expended about 8.2 percent of their income on food, while French and South Korean households spent about 13.5 percent (Plumer 2015; Gray 2016).

Lower prices and higher wages encouraged waste throughout food systems. Farmers unable to profit by harvesting food, fed it to animals or ploughed it under (Howard and Wad 1931; Shover 1965; Rao 2015). Supermarket chains developed stringent standards for the produce they bought: fruits and vegetables had to be well-shaped, uniformly sized, and properly coloured, among other specifications; items that did not measure up to these standards were trashed. Supermarket managers found it easier to overstock items than to risk disappointing customers, but items that could not be sold when the items were at their peak ended up in the dump. Food manufacturers and retailers found it more efficient to discard surplus or outdated supplies than to try to salvage them (Stuart 2009). Restaurateurs supersized their offerings and plate waste surged with larger servings and larger plates used in restaurants and restaurant chains (Herzka and Booth 1981; Kosseva and Webb 2013). Consumers bought larger packages or two-for-one sales in supermarkets, and in some cases also discarded wholesome food due to aesthetic factors (Van Garde and Woodburn 1987).

By the 1950s, convenience became a major selling point for processed foods. “Instant” mixes, heat-and-eat frozen meals, and, later, microwaveable entrées could be served in a matter of minutes. Cafeterias, commissaries, buffets, snack bars, lunch counters, kiosks, coffee shops, canteens, and fast food chains flourished. By the early twenty-first century, consumers in some countries were spending almost half of their food budgets on meals prepared outside the home (Jamrisko 2015). Purchase of food prepared outside the home and convenience food for the home, contributed to the loss of traditional cooking skills once handed down through generations (Jaffe and Gertler 2006; Aschemann-Witzel 2018). There was little incentive for consumers to be concerned about leftovers in restaurants or food waste at home.

At home, kitchen refrigerators and pantries got bigger as the century progressed (Rees 2013). Ironically, overstocked refrigerators and brimful pantries contributed to waste as items were pushed to the back of a crowded fridge or pantry. In time, they soured or spoiled and ended up in the trash. Another invention, the in-sink garbage disposal solved the problem of unsightly, smelly, unsanitary kitchen garbage, but was just a convenient way of delivering scraps to the dump. As critics pointed out, they also wasted a lot of water, and fats, oils, and grease ground down garbage disposals occasionally clogged household drains and could cause “fatbergs,” large masses of congealed cooking fat that blocked sewage systems (Hester 2018).
Another innovation is modern food packaging. Food packaging evolved as a way to prevent spoilage. Waxed paper, foil, cans, bottles, and jars preserved and conserved food, prolonging its useful life. Packaged food products enabled long-distance food supply chains as it was possible to ship food safely over long distances from processor to retailer to consumer. Constant innovation in plastic containers and wraps prolonged shelf life still further. Shoppers, however, could not see, smell, or touch the contents of the package, and only after opening it could spoilage be discovered. To help grocers and shoppers determine whether packaged products were still fresh and wholesome, processors began labeling packaged foods and beverages with a date indicating when the product had been packed, or when it was recommended that the food be consumed by, or when its shelf life would expire. Some processors began labeling milk products with a date in the 1930s. Marks & Spencer, a British department-store chain, began doing so in the 1950s. In the late 1960s, Kroger, an American supermarket chain, required sell by dates on cartons of milk and some other dairy products. These were intended to indicate when these products would begin to spoil or smell “off” (Newsome et al. 2014).

With “sell-by” or “best if used by” dates clearly marked, retailers and consumers could discard foods after the date had expired. But there was no consistency in the labeling: Food companies employed a variety of labeling systems and terminology, and by the 1970s there were more than 50 different versions of product dating, causing confusion among retailers and consumers (Salisbury 2016). Consumers who were (and remain) confused or obsessed with quality tend to discard perfectly edible food when the labeling shows it to be “outdated.” A 2009 UK survey, for example, found that

53 per cent of British consumers did not eat fruit or vegetables that exceeded the ‘best before’ date, 56 per cent did not eat bread or cake; and 21 per cent never even ‘take a risk’ with food close to its date.

(Shields 2009)

A 2011 report revealed that about 450,000 tonnes of food were thrown away because it had passed a “best before” date (Lyndhurst 2011). Had the food been stored properly, it would have been perfectly safe to eat up to and after this date. In addition, the report estimated that 380,000 tonnes of food were tossed out because it had passed a “use by” date – waste that could have been avoided had the food been cooked or frozen before that date (Lyndhurst 2011). Others have linked these behaviors to concerns around food safety, such as a 2017 study in Scotland showing that more than 50 percent of the country’s population threw away perfectly edible food that was approaching or past its “best before” date, and the reason why 62 percent did so was the fear of “getting ill” (Luiza et al. 2017). Confusion around terminologies abound as a 2014 Belgian study found that 30 percent of those surveyed did not know the difference between “use by” and “best before” labels (Boxstael et al. 2014). This finding is further supported by a 2015 European Commission study, which found that fewer than half of those surveyed knew the meaning of “best before” labels (Shepherd 2016).

Concern with food safety contributes to increased waste and is often followed with the popular phrase, “When in doubt, throw it out,” becoming the rule of the day beginning in the 1950s (Bracken 1960). Discarded food could be easily replaced, so rather than worry about off-flavors and potential food poisoning, it was easier for businesses and consumers to toss out discolored or bruised produce and packaged foods passed their prime. The following section explores the waste infrastructures enabling such ease of dumping food.
Early environmental concerns: landfills to climate change

Historically, refuse generated in populated areas was dumped outside town or city limits, often into nearby lakes, rivers, or swamps. Coastal cities shipped waste out to sea and dumped it in the ocean. As towns and cities grew and the composition of waste became more complex, new solutions were required and increasingly wastes were burned in bonfires or incinertors. The first so-called “sanitary landfill” was created in Fresno, California, in 1935 (Melosi 2002). After garbage was dumped by the truckload and compacted, it was covered each day with a layer of clean soil to reduce rodent activity and odours.

The environmental movement that emerged during the 1960s was concerned with conserving natural resources, controlling pollution, protecting endangered species, saving the rain forests, preventing desertification, and stopping exploitation of the oceans. Beginning in the 1970s, environmentalists in Europe, Japan, and North America began to focus on solid waste disposal, advocating recycling, reducing, and reusing rather than dumping it in landfill sites. Paper, metal, and glass were the first materials targeted for recycling. Progressive communities in North America began requiring residents and businesses to recycle, establishing collection and recycling programs for paper products, bottles, and cans (Strasser 2000).

Governmental agencies began to take action to limit the amount of material being dumped into landfills. For example, the European Union established the Landfill Directive in 1991, with the mission of reducing

negative effects on the environment, in particular the pollution of surface water, groundwater, soil and on the global environment, including the greenhouse effect, as well as any resulting risk to human health, from the landfilling of waste, during the whole life-cycle of the landfill.

(European Commission 1999)

Despite legislations to promote recycling, environmental hazards remain. In paper recycling programs, food particles, grease, and oil on paper recyclables, such as soiled pizza boxes or grease-stained paper products, could contaminate entire loads of recyclables, making them unusable or greatly reducing their value. In addition, food residue can create unsafe conditions for workers in recycling facilities. Estimates vary, but in the US alone an estimated 25 percent of paper recyclables are covered primarily with food waste (The Week 2019). Another serious environmental problem emerged with food waste sent to landfill. When food and other organic matter end up in landfills, they are compressed tightly underground and are deprived of oxygen. This results in the production of vast quantities of methane, which is 25 times more damaging to the earth’s atmosphere than carbon dioxide (CO₂). The US Environmental Protection Agency (EPA) estimated that 63 million tons of food were sent to landfills each year, producing about 34 percent of American methane emissions (Scientific American 2019). Dumping food waste in landfills generates much more methane than do other mechanisms of handling such waste. In composting, food scraps are exposed to oxygen, and they produce CO₂; but decomposing food in a landfill is tightly compressed underground in an anaerobic state, resulting in the production of methane. Reducing food waste in landfills, therefore, was an early priority among environmentalists, but it was not until the early twenty-first century that the general public became aware of food waste’s contributions to climate change.
Food waste’s relationship to climate change has been on the international agenda since the late 1970s. In 1979 the World Climate Conference, organized by the World Meteorological Organization, called for nations to halt preventable environmental damage. In 1988, the United Nations established the Intergovernmental Panel on Climate Change. Most scientists believe that human actions – particularly the burning of fossil fuels and the release of greenhouse gases (GHGs) – including CO₂ and methane – have directly contributed to climate change (Smith 2017). Food systems are major contributors to GHGs throughout the world. Growing, processing, and transporting food make substantial contributions to these emissions, as does the food waste in landfills. In 2015, the Food and Agriculture Organization estimated that if food waste was country, it would be the third largest emitter of GHGs in the world. Environmental efforts around the world have now jumped on the anti-food waste bandwagon in hopes of stemming global warming (FAO 2015).

Measuring the scale and impacts of food and organic waste

In 1973 William Rathje, an American archaeologist, began to examine garbage in the landfills in Tucson, Arizona. For several decades he and his collaborators tracked trends in what materials ended up in the trash (Harrison et al. 1975; Rathje 1984; Rathje and Murphy 2001). His research and subsequent studies revealed that food was the single largest component of solid waste. These studies did not include food scraps ground up in garbage disposals and washed into sewers, food-related packaging, or food scraps that ended up as compost or animal feed.

Others evaluated waste in a different way, by examining the availability of food in national systems. A 1980 study in the United Kingdom, for instance, reported that about 3,100 kilocalories of food were available to each person per day. As the average person required only 2,200 kilocalories, the authors concluded that a large portion of the remainder was wasted “in the home as well as in catering establishments and during the storage, distribution and processing of food” (Wenlock, Buss, and Derry 1980). In the same year, studies in the US found that about 35 percent of caloric value, including fat, liquid discards, disposal and compactor waste, and food fed to animals, was wasted (Gallo 1980). In 1997 the Economic Research Service of the US Department of Agriculture concluded that about 96 billion pounds of food, or 27 percent of the 356 billion pounds of edible food available for human consumption in the US, were lost to human use at these three marketing stages in 1995. Fresh fruits and vegetables, fluid milk, grain products, and sweeteners (mostly sugar and high-fructose corn syrup) accounted for two-thirds of these losses (Kantor et al. 1997). By the twenty-first century, the US produced 4,200 calories per person per day. As only about 2,200 calories are needed per day, almost one-half of the available food was lost somewhere in the food system (USDA, n.d.).

Developing solutions for food waste

There are many ways of dealing with waste, from reducing production to sending it to landfill. In 1979 Ad Lansink, a Dutch politician, developed a Waste Ladder with five rungs: disposal, recovery, recycling, reuse, and prevention. As food waste became an important topic within the environmental movement, several food waste reduction hierarchies were proposed, creating “Food Recovery Hierarchies,” such as the one shown in Figure 2.1
Traditionally, waste was the end result of a linear economy: food (and other goods) was produced, sold, and consumed, and the leftovers were discarded. During the 1980s, the concept of the “circular economy” was proposed (Pearce and Turner 1990). Circular economy advocates consider wasted food as a resource to be used, and not garbage to be thrown away.

Several approaches emerged to reuse or recycle food waste. Traditionally, excess food on farms was fed to animals (Bruttini 1923). Interest in conversion of waste to animal feed was renewed in the 1980s (Ledward et al. 1983). Another traditional solution was composting, which was easy to do in rural and suburban areas, but cities produce the vast majority of organic waste that ends up in landfill. During the late twentieth century, public and private projects emerged around the world to collect organic waste and convert it into compost for use on farms or in city parks (Karidis 2017).

New solutions emerged in the late twentieth century. Food waste and other organic material could be converted into biogas via anaerobic digestion – the process by which microorganisms break down organic material into methane. The science behind anaerobic digestion had been known for more than a century, but it garnered new interest during the oil crisis of the 1970s (Klinkner 2014). Beginning in the 1990s, Germany took the lead in constructing anaerobic digestion plants. Biogas production diverts organic waste from landfill and generates a renewable energy source that can be used to power vehicles, generate electricity, and supply fuel to homes and businesses. Anaerobic digestion facilities also produce nutrient-rich “digestate” which can be used as fertilizer. Despite these positives, low oil prices in the late 1990s made it unclear whether anaerobic digestion programs were financially viable.

Some countries made solid progress in reducing the amount of food waste sent to landfill. In 1991, Japan passed the Law for the Promotion of Effective Utilization of Resources and a decade later passed the Food Recycling Law. These encouraged businesses to create cyclical manufacturing processes that would reduce, reuse, and recycle any leftover waste. A revision of the laws in 2007 encouraged businesses to turn their waste into compost or animal feed (Marra 2014). South Korea required the separation of food from other waste in 1997, and implemented a “pay-as-you-throw” program in Seoul beginning in 2005. Its

Figure 2.1 Food Recovery Hierarchy.
Source: Adapted from the US Environmental Protection Agency.
implementation was coupled with a major public relations campaign to gain support from consumers, and seven years later it was fully implemented in four million households. This system requires consumers to pay by weight for the food they throw away, the goal being to reduce food waste by creating a financial incentive to generate less garbage. The collected food waste is processed into animal feed or compost, or used to generate electricity. By 2015 household food waste had been reduced by 30 percent, and by 2019 South Korea recycled 95 per cent of its food waste (Hogan 2015). The following section explores the growth in efforts to ensure that food that might otherwise go to waste is fed to people.

**Feed people**

During the 1950s many prosperous countries established social welfare systems that provided minimum standards of living for all their citizens, with the goal of mitigating problems of malnutrition and hunger. The US did not develop such a system. In the 1960s, media exposés and government investigations brought the issue of hunger back to light (Poppendieck 1998). After massive media attention, public gatherings, government hearings, and high-profile reports, new federal programs were instituted, as were local plans to feed the hungry. However, during the 1980s President Ronald Reagan sharply cut funding to these programs to reduce the national debt. Local food pantries, soup kitchens, and food-rescue programs were launched or expanded by churches, unions, and civic organizations to take up the slack, providing food directly to those in need (Riches 2018).

Food banks – warehouses that receive food donations from processors, retailers, distributors, and individuals – were established throughout the US (Poppendieck 1998). Regional supermarket chains and wholesalers continue to donate tons of mislabeled or damaged packaged foods, overstock, test-market products, returned items, and short-dated foods. These are then sorted and distributed to affiliated food pantries, soup kitchens, and other hunger relief organizations, which are monitored by the supervising food bank to assure that the food is handled and distributed safely. This system “rescues” millions of tons of food that would otherwise end up in landfill – and, more important, it provides nourishment to millions of people who are hungry or food insecure. Riches (2018) provides a critical account of the ethics and efficacy of this system, however (see also Midgley’s chapter, this volume).

The food bank model was also established in other countries. In 1985 the French comedian and actor Michel Gérard Joseph Coluche founded Les Restaurants du Cœur (Restaurants of the Heart) and in 1989 the Fondazione Banco Alimentare Onlus was founded in Italy to retrieve and distribute undamaged and non-expired food, that would otherwise have been destroyed, and distribute it to the needy. Food banks and food pantries, however, were not common outside the US until the economic crisis hit in the early twenty-first century. The geopolitical precursors of this crisis are outlined in the following section.

**The storm hits**

A major problem with industrialized food systems is that they are dependent on cheap oil to fuel farm equipment, power trucks and ships, make fertilizer, and operate food-processing facilities. When the Arab-Israeli War began in 1973, the oil-producing Arab nations embargoed oil, pushing up the prices of both fuel and food, but prices declined when the embargo ended in 1974 (Attarian 2002). Oil prices edged up again in 2002, when the US and other countries considered invading Iraq, a major oil producer in the Persian Gulf. When the invasion began in March of 2003, oil prices skyrocketed, causing a huge jump in
global prices for food, particularly corn, wheat, and soy, which in turn bumped up the cost of grain-fed pork, beef, and chicken (FAO 2009).

To alleviate the fuel crisis, the US, Brazil, the European Union, Canada, China, and other nations subsidized production of ethanol (a renewable biofuel made largely from sugarcane, sorghum, corn, barley, and other grains) to promote energy independence (Shepherd 2008; FAO 2009). These programs diverted food crops from the market, pushing food prices even higher.

The global food system could likely have overcome rising oil prices and increased ethanol production had it not been for simultaneous adverse weather conditions. In Australia, two years of drought decimated the wheat crop (Wong 2008). Grain production in Ukraine and Russia, where much of the crop had previously been exported, was also curtailed (Kramer-aug 2010). India faced domestic food shortages. In June 2006, India stopped exporting sugar, wheat, and lentils in an effort to stabilize domestic food prices. India subsequently banned exports of rice except basmati (Bhupta 2008), and Vietnam, the world’s third biggest rice exporter, cut its rice exports (Minh and Mukherji 2008).

As food prices soared globally, speculators jumped into commodities markets and began buying grain and other futures, pushing prices still higher (Economist 2007). In May 2007, the world price of wheat was $200 per ton; by early September it had risen to more than $400 – the highest price ever recorded (Economist 2007). Three months later, world cereal stocks based as a proportion of production were the lowest ever recorded. Russia imposed price controls on milk, eggs, bread, and other staples. Venezuela legislated price controls on food (Wroughton 2008). These policies further depleted food supplies worldwide as farmers stored or exported commodities rather than sell them at artificially low prices (Wroughton 2008).

Between 2005 and 2007, food prices jumped by 75 percent. From the spring to the fall of 2007 wheat prices doubled, as did the cost of milk, oilseeds, and other basics. In December 2007, The Economist’s food-price index was higher “than at any time since it was created in 1845” and the magazine proclaimed “the end of cheap food” (Economist 2007). In many parts of the world unstable oil and food prices made it difficult for farmers to make a living (Campbell 2008). In March 2008, the United Nations Secretary-General, Ban Ki-moon, reported that with the threat of hunger and malnutrition growing, millions of the world’s most vulnerable people were at risk (Ki-moon 2008).

Yet another challenge was the financial meltdown initiated by a slowing US economy, worsened by the mortgage crisis that hit in December 2007 (Andrews 2007). As business and financial institutions succumbed, the result was the Great Recession, the largest global economic downturn since the Great Depression of the 1930s. Worldwide, both large corporations and small companies collapsed, and millions of workers lost their jobs. Despite rising unemployment, deflationary pressure on prices, and a strong US dollar, global food prices remained high (Araghi 2009).

Various commodity prices increased from 50 to 200 percent throughout 2007 to the end of 2008 (FAO 2009). Food insecurity, malnutrition, and hunger haunted millions of people throughout the world. An estimated 110 million people were thrown into poverty and 44 million were undernourished. Infant and child mortality also increased (Nellemann et al. 2009). During Ramadan in 2008, the government of Morocco fixed the price of bread so that people could afford it – if they could find any to buy (Streitfeld 2008). Consumer groups in Italy staged a one-day pasta strike (Sydney Morning Herald 2007). In Pakistan, paramilitary troops were deployed to guard trucks carrying wheat and flour. Malaysian leaders made it a crime to export flour and other products without a license. Food riots and other forms of unrest erupted in 30 countries, including Haiti, Egypt, Bangladesh, Somalia,
Burkina Faso, Guinea, Mauritania, Mexico, Morocco, Senegal, and Uzbekistan (Bush 2010; Lagi et al. 2011).

Projections varied, but some suggested that food prices would continue to increase by 5 percent per year for a decade (Chapman 2008). Reports by the United Nations Environment Programme and the World Bank projected that food prices could rise by 30 to 50 percent within decades, forcing those living in extreme poverty to spend up to 90 percent of their income on food (Nellemann et al. 2009). Even more worrisome were dire warnings about the negative effects of climate change on agriculture and food availability, while the world population was projected to reach 9.1 billion by 2050.

In the face of a looming food crisis, scientists, agriculture experts, and political leaders organized conferences, academics published articles and books, and foundations and governmental agencies issued reports addressing ever-rising food prices, growing world hunger, and threats to the environment. Some argued for sending more aid to developing countries and improving information systems to monitor and assess the impact of rising food prices (FAO 2009). Others proposed bringing new land into cultivation and expanding industrial agriculture—which many environmentalists strongly opposed.

As food prices rose, many countries also began to raise concerns about food waste. In the Netherlands, the Ministry of Agriculture, Nature and Food Quality began to focus on food waste in 2006 and, by 2010, was supporting many activities targeting food waste. In the UK, the Department for Environment, Food & Rural Affairs (Defra) concluded that waste could be reduced in agricultural operations (Defra 2006). Defra also funded the Waste & Resources Action Programme (WRAP), creating public–private partnerships intended to achieve a circular economy, which WRAP defined as

an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life.

(WRAP 2019)

WRAP initially focussed on packaging and other materials that ended up in landfills, but food waste soon became part of its mandate.

WRAP reported in 2005 that it had “limited information about the amounts and types of food waste produced,” so it launched a major research effort to quantify the nature, scale, origin, and causes of post-consumer food waste in the UK. The study was based on surveys of 2,000 households where families kept kitchen diaries—records of what they purchased, consumed, and discarded. In March 2007, WRAP published Dealing with Food Waste in the UK, a report concluding that there was “a genuine opportunity for the UK to take a lead in dealing with biowaste (i.e., food and organic garden waste) in Europe. It can learn from experience in other countries and manage biowaste more cost effectively and sustainably” (Hogg et al. 2007).

In May 2007, David Miliband, the UK Environment Secretary, announced the first new waste strategy for England since 2000. He proposed “pay-as-you-throw” rubbish taxes and encouraged local councils to collect food waste on a weekly basis. The waste was to be “converted into … gas in digesters, and can then be used to produce heat and electricity” (BBC News 2007a). That summer, Prime Minister Gordon Brown and his government tried to institute weekly food waste collections and to impose taxes on discarded food. The strategy brought opposition from many local councils, and in October Brown dropped plans for the taxes (BBC News 2007b; Channel 4 News 2008).
As food prices continued to rise, WRAP hired Trimedia, a public relations firm, to help develop a campaign encouraging consumers to reduce in-home food waste and keep food out of landfills. The campaign, called “Love Food, Hate Waste”, was supported by leading chefs and food writers. The campaign was launched in November 2007 at London’s Borough Market, a major wholesale and retail food market that operated in accord with campaign values and was accessible to journalists and film crews. Speakers included Joan Ruddock, Defra’s Parliamentary Under Secretary of State. By June 2008 the campaign had amassed more than 550 pieces of coverage in print and electronic media (Black 2008).

On 8 May 2008, WRAP released a report called “The Food We Waste.” It revealed that 6.7 million tons of food were thrown away each year in the UK, of which 4.1 million tons were avoidable. The report concluded that UK consumers spent £10.2 billion on wasted food each year, which worked out to £420 of annual avoidable waste for the average household. Even householders who claimed that they generated no food waste produced on average 2.9 kilograms of it per week (WRAP 2008). Since food prices were still climbing, it was a timely message. The press and online sources played up the “Shocking Food Waste Report,” as one source headlined it (LetsRecycle 2008).

In November 2009, WRAP released two new reports: “Household Food and Drink Waste in the UK,” and “Down the Drain.” The first estimated that “8.3 million tonnes per year of food and drink waste is generated by households in the UK” (Quested and Johnson 2009). “Down the Drain” explored food and drink waste from UK households that was disposed of via sewer systems. The report estimated that “1.5 million tonnes of the food and drink disposed could have been avoided had it been better stored in the home or with better planning or preparation.” It placed the cost of this to consumers at £2.7 billion, and also highlighted the environmental price: An estimated 4.6 million tons of CO₂ equivalent GHG emissions were released by UK households annually (Gray 2009).

The success of Trimedia’s public relations campaign gave Gordon Brown the opportunity to revitalize his support for food waste reduction, and he found an excellent showcase for it at the G8 meeting of the world’s major industrialized countries, held in Hokkaidō, Japan, in July 2008. At the meeting Brown announced a campaign to stamp out waste in the UK, declaring war on food waste as part of a global effort to curb spiraling food prices. Brown said that the solution to ever-rising food costs was to devise a “global plan” to reduce food waste, “which is costing the average household around £8 a week” (Lawson 2008).

Not everyone jumped on board with Brown’s call to reduce global waste, but his comments set the stage for several significant events in 2009 in the UK. The first was Defra Minister Hilary Benn’s announcement of a “War on Waste.” Benn announced construction of new biogas facilities that would produce fuel from organic waste, and he argued for the end of “sell until,” “sell by,” “display until,” and “best before” dates on packaged foods. These caused confusion, he said, and led to tremendous waste. The only useful label was the “use before” date, which was legally necessary for safety.

When we buy food, it should be easy to know how long we should keep it for and how we should store it. Too many of us are putting things in the bin simply because we’re not sure, we’re confused by the label, or we’re just playing safe.

(Smithers 2009)

The second major event was the publication of Waste: Uncovering the Global Food Scandal (Stuart 2009). Written by Tristram Stuart, a writer, dumpster diver, vegan, and activist, the book contained jaw-dropping facts about food waste that came as a genuine shock to most
readers. It was simultaneously released in the US and subsequently translated into French, German, Spanish, and Chinese.

To help reduce and recycle food waste, Stuart founded an environmental non-profit organization called Feedback, which, along with a coalition of other groups, staged a public “Feeding the 5000” meal in London’s Trafalgar Square on 16 December 2009. Using only “recovered” food from supermarkets, bakeries, and other sources, the organizers fed thousands of Londoners while helping to raise a public outcry over the issue. The event garnered extensive media coverage, focusing the public’s attention on reducing, reusing, and recycling food waste. The global war on food waste had commenced. The following section explores developments beyond the UK.

A globalizing social movement: The media and organizational deluge

The American filmmaker Jeremy Seifert released his documentary Dive! in October 2009. Its purpose was to publicize the staggering amount of food wasted in the US. Seifert filmed dumpster divers behind Los Angeles supermarkets, including Trader Joe’s, salvaging thousands of dollars worth of edible food, some of which Seifert cooked to share with his wife and son. Seifert confronted supermarket executives, urging them to donate more food to local food banks. The film ends with a quotation from Noam Chomsky, the philosopher, social critic, and political activist: “Change doesn’t trickle down from above, it grows from below.” Managers of food banks thanked Seifert as they reported big jumps in donations from local supermarkets (Lenneman 2013).

Dive! was just the first in a series of films and television programs to address the issue. Olivier Lemaire’s documentary, Global Waste: The Scandal of Food Waste, was released in August 2010. It starred Tristram Stuart, who traveled from Europe to Ecuador, India, the US, and Japan looking at the issue of food waste. The film targeted the culprits – food producers, industrialists, distributors, and consumers – and also noted innovations and solutions for decreasing waste (Lemaire 2011). At virtually the same time, BBC One released The Great British Waste Menu, a documentary that followed four chefs (Angela Hartnett, Richard Corrigan, Matt Tebbutt, and Simon Rimmer) as they sourced unwanted food from farms, supermarkets, and homes and then transformed the ingredients into “mouth-watering dishes” (Ratcliffe et al. 2010).

In Denmark, Selina Juul, a Russian émigrée, launched a Facebook group in 2008 that grew into a non-profit organization called Stop Spild Af Mad (Stop Wasting Food). Juul began publishing opinion-editorials and articles on food waste in Danish and international newspapers, many of them co-written with prominent politicians, and she collaborated with Danish chefs to publish Stop spild af mad: en kogebog med mere (Stop Wasting Food: A cookbook and more). Stop Spild Af Mad quickly became the country’s largest consumer movement against food waste (Juul et al. 2011).

Ilse Aigner, the German Minister for Food, Agriculture, and Consumer Protection (BMELV), launched an anti-food waste campaign called “Better Appreciation of the Value of Food!” in 2010, but it generated little interest (GAIN Report 2013). This changed when Valentin Thurn released the documentary, Taste the Waste: warum schmeissen wir unser Essen auf den Müll? (Why do we throw our food in the trash?) in September 2011, followed the same year with the book, Die Essensvernichter: warum die Hälfte aller Lebensmittel im Müll landet und wer dafür verantwortlich ist (The Food Destroyers: Why half of our food ends up in the trash, and who is responsible) (Kreutzberger and Thurn 2011; Thurn et al. 2011). The book reported that European households threw away 100 billion euros worth of food every year, and that the amount of food wasted in Europe was “enough to feed all the hungry people
in the world two times over.” The film and book also revealed that food rotting in garbage dumps has a disastrous impact on the world’s climate.

Thurn’s work catalyzed a growing social movement against food waste in Germany. In March 2012, the University of Stuttgart reported that Germans wasted about 11 million tons of food each year, which worked out to 82 kg (176 lb) per person per year, about two-thirds of which came from private households (Kranert et al. 2012, p. 9). Ilse Aigner, the Minister for Food, Agriculture, and Consumer Protection (BMELV), announced a nationwide campaign to combat food waste. It informed Germans about how much food they throw away and why they do so, and enumerated steps citizens could take to reduce waste (GAIN Report 2013). The BMELV released an app called “Zu gut für die Tonne!” offering cooking suggestions and recipes to help homemakers shop, store, and utilize food with less waste (Too Good for the Bin 2012). The BMELV in cooperation with Slow Food Deutschland and Die Tafel (a non-profit that serves as the umbrella organization for the food surplus redistribution network), organized nationwide days of action called “Wir retten Lebensmittel!” (We save Food!).

Austrian activist David Gross launched Wastecooking, a collective that focussed on reducing food waste, in May 2012. Wastecooking opened Europe’s first free supermarket in 2013. Two years later, Georg Misch filmed Gross as he journeyed through European countries gathering discarded food and preparing meals with it. His traveling kitchen was a converted garbage receptacle that he towed behind a biodiesel-fueled vehicle. This led to the series, Wastecooking: Kochen statt Verschwenden (Wastecooking: Make Food, Not Waste), which first aired in 2015. It featured chefs, scientists, and activists, and offered viewers simple ways to reduce food waste (Misch 2015).

Europe passed the Waste Framework Directive in 2008. It defined bio-waste as “biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants” and laid the basis for the EU to become a recycling society (European Commission 2008). The French Environment and Energy Management Agency launched an anti-food waste campaign aimed at consumers in November 2010 (ADEME 2010). The campaign included television and radio spots, print ads, and web banners. Consumer surveys were undertaken to improve understanding of why consumers wasted food. After due consideration, France committed to cut food waste in half by 2020.

In October 2014, the French chefs Cyril Lignac, Philippe Etchebest, Ghislaine Arabian, Yves Camdeborde, and Florent Ladeyn participated in a television program called “Gaspillage Alimentaire: Les Chefs Contre-attaquent” (Food Waste: The Chefs Fight Back) (LeclercMaisDrive 2014). It highlighted the importance of reducing food waste in France. Two months later, Arash Derambarsh, a city councilor of Courbevoie, France, started a “field experiment” that acquired unsold supermarket food destined for the trash and distributed it to the needy. The experiment was so successful that Derambarsh launched a change.org petition to demand that the French parliament pass a law requiring supermarkets to donate edible food to hunger programs. In just four months, the petition attracted more than 200,000 signatures along with celebrity endorsements. Within the year a law was passed prohibiting supermarkets from discarding edible excess food (Derambarsh 2016).

In Spain, La asociación de fabricantes y distribuidores (The Spanish manufacturing and distribution association) launched a campaign in 2012 to reduce waste along the whole food chain and optimize reuse of the excess food. Their tag line was “Food has no waste.” The following year, the Spanish Ministry of Agriculture, Food and Environment (Magrama) launched the “More food, less waste” initiative that supported food waste studies, distributed
guides to reduce loss and waste of food, and launched campaigns targeting consumers and the catering industry.

The European Commission declared the year 2014 the “European year of food waste.” The following year, the EU adopted the Sustainable Development Goals, including a target of halving per capita food waste at the retail and consumer levels by 2030, and reducing food losses along the production and supply chains.

Jonathan Bloom, an American journalist, became interested in food waste while volunteering in a food pantry in Washington, DC in 2005. After five years of research into the problem, he published *American Wasteland: How America Throws Away Nearly Half of its Food (And What We Can do about It)* (Bloom 2010). He created the “Wasted Food” website, a blog, and a Twitter feed, and began speaking throughout the US. The US EPA jumped on board the fast-expanding anti-waste movement, launching the Food Recovery Challenge in 2011. This supported universities, businesses, and community organizations in making their food management systems more sustainable. The National Resources Defense Council began publishing reports on related topics, including “Wasted: How America is losing up to 40 per cent of its food from farm to fork to landfill” (Gunders 2012) and “The Dating Game” (Leib et al. 2013). In 2013, Danielle Nierenberg and Ellen Gustafson co-founded Food Tank, a non-profit organization that continues to be a leader in promoting anti-food waste efforts.

In January 2012, The Food Network hosted a special, *The Big Waste*, that brought together four top chefs (Bobby Flay, Michael Symon, Anne Burrell, and Alex Guarnaschelli) to explore the potential of America’s burgeoning food waste. The chefs collected discarded food from various sources and then prepared meals using only those ingredients. The program included discussions of waste in food preparation and distribution, a dumpster-diving session behind a supermarket, and a look at waste on the farm.

This was just the beginning of the anti-food waste blitz: Other documentaries and television series have kept the torch burning. Popular films include Grant Baldwin’s *Just Eat It: A Food Waste Movie* (2015), Emily Broad Leib and Nathaniel Hansen’s *Expired? Food Waste in America* (2016), and Anthony Bourdain’s” (2017) showcasing celebrity chefs including Dan Barber, Mario Batali, Danny Bowien, and Massimo Bottura. In 2016, British chef and activist Hugh Fearnley-Whittingstall hosted a BBC series called *Hugh’s War on Waste*, and Australian comedian Craig Reucassel presented a similar series on Australian television in 2017. In June 2018, the film *Food Fighter* was released in Australia to great acclaim. It followed Ronni Kahn, founder of the food-rescue organization OzHarvest, as she crusaded against food waste not just in Australia, but in other countries as well. Today, few weeks pass without the release of another television program, documentary, YouTube video, film, or other media program related to some aspect of food waste (Smith 2019).

Major conferences focussed on food waste are now regularly convened throughout the world. New projects, initiatives, and inventions intended to reduce the waste of food are launched by governmental agencies, non-profit organizations, and businesses. Academics release new studies and make recommendations on aspects of food waste. New facilities are funded or implemented to convert organic waste into compost or renewable energy, and innovators release new equipment or technology intended to reduce or “upcycle” food waste into a useable resource. There are frequent launches of new apps and platforms intended to reduce food waste, and governments continue to pass laws mandating new recycling programs or restricting certain types of waste. Food waste will likely continue to be on the agenda of farmers, businesses, governments, and consumers for the next decades.
As everyone wins – financially, morally, and environmentally – by reducing food waste, it will likely remain on the world’s agenda for decades to come.

Note
This chapter has been compiled using sources from the “Food waste and food recovery bibliography.” Currently in its 26th version, it is 614 pages long (and still growing). The bibliography catalogues all materials that have been found related to food waste and food recovery. These include books, academic journals, newspaper and magazine articles, web and blog posts, government reports and as well as an eight-page list of Historical Material Pre-1955. For more information on how to access the bibliography, please contact Andrew F. Smith (www.andrewfsmith.com).

References
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