

Spring 5-7-2014

Want All, Waste All: Exploring Food Waste in the United States

Ani Esenyan

Fordham University, aesenyam@fordham.edu

Follow this and additional works at: https://fordham.bepress.com/environ_2014

Part of the [Environmental Sciences Commons](#)

Recommended Citation

Esenyan, Ani, "Want All, Waste All: Exploring Food Waste in the United States" (2014). *2014 Student Theses*. 1.
https://fordham.bepress.com/environ_2014/1

This is brought to you for free and open access by the Environmental Studies at DigitalResearch@Fordham. It has been accepted for inclusion in 2014 Student Theses by an authorized administrator of DigitalResearch@Fordham. For more information, please contact considine@fordham.edu.

Want All, Waste All

Exploring Food Waste in the United States

Ani Esenyan

Environmental Policy

Senior Thesis 2014

Dr. John van Buren

Table of Contents

Abstract...3

Introduction...4

Chapter One...6

Food Waste Trends in the United States

Chapter Two...19

History of Food Consumption and Production

Chapter Three...26

Politics of Food

Chapter Four...34

Economic and Environmental Implications of Food Waste

Chapter Five...43

Ethics of Food Waste

Conclusion...49

Want Not, Waste Not

Abstract

This thesis examines food waste within the United States as an environmental and social problem. It is estimated that 40% of food in the United States is thrown out every year, and the disciplines highlighted in this thesis explains why food waste exists. First, the amount of food wasted and the reasons behind the waste is explored. Second, the history of food production and consumption within the United States is analyzed to give further explain the waste epidemic. Third, the agricultural policies which have contributed to food waste are explained in detail. Fourth, the economic and environmental impacts of food waste are emphasized. Fifth, the concept of environmental justice is applied to the ethical issues surrounding food waste. Finally, a number of solutions are presented to end food waste.

Introduction

As one of the most prosperous nations in the world with an infinite source of food, the United States has lost touch with the value of food. Our consumer culture and food system has led to the disappointing epidemic of food waste. Approximately 40% of all food in the United States goes to waste. Consider these statistics associated with food waste. By wasting food we have wasted 25% of all freshwater and 4% of oil utilized in the United States. Food waste accounts for 33 million tons of material found in landfills and just getting food waste to dumps requires \$750 million a year. The United States spends \$165 billion to produce food which is never consumed.¹ This thesis explores the food waste epidemic within the United States from a multidisciplinary approach. The first section analyzes the root causes of food waste. By taking an in depth look at how the retail food industry and food production industry operates, the end result of food waste is explained. Additionally, reasons for food waste on the consumer level is also explored which is yet another main source of waste. Next, the history of food production and consumption habits in the United States is explored. The evolution of our agricultural practices and technologies, as well as the changes in our eating habits set the stage for modern day food waste. The third chapter gives more details regarding the agricultural policies which affect our ability to produce more than enough food. The fourth chapter highlights the economic and environmental impacts of food waste. Specifically, the amount and types of resources which are wasted as a result of food waste are explained, and the environmental degradation resulting from food waste is explained. Bringing in the social impacts from food waste, the fifth chapter

¹ 2013. "Your Scraps Add Up." *nrdc.org*. March. http://www.nrdc.org/living/eatingwell/files/foodwaste_2pgr.pdf.

details the concept of environmental justice and explains how food waste is a type of environmental injustice, as individuals are affected by our food system and food waste. As the final chapter identifies, the issue of food waste can be stopped. The concluding chapter identifies solutions to the causes of food waste, helpful suggestions for individuals and a case study of the United Kingdom, as they are tackling food waste head on. It is odd to say that there is an upside to an environmental problem. However, there is an upside to food waste as a national environmental issue; it can be stopped. This thesis explains why food waste in the United States is present, but the causes for food waste can easily be addressed by being more mindful of the precious resource that is food.

Chapter One:

Food Waste Trends in the United States

It is an alarming fact that 40% of all the food produced in the United States is wasted every year.² At every stage involved with food consumption, there is an identifiable pattern of waste. First, the commercial aspect of food from grocery stores to restaurants are culprits of waste. Second, there is food waste at the production stage of food with the industrialization of agriculture. Finally, on a consumer level, waste can be attributed to households and individuals. This chapter will examine the causes behind this chain of food waste, what types of food are wasted and reveal the astounding numbers associated with this phenomenon.

Commercial Food Sector The cause of food waste is simple: our demand for food. While it is the most natural instinct to demand food, the culture of food consumption in the United States has taken a drastic turn for the worst; our expectation of what food should be is incredibly high. A main culprit of these expectations stem from the retail industry. Supermarkets and grocery stores wasted 43 billion pounds of food in 2008 which measures to 10% of all food in retail. From unsold produce alone the United States Department of Agriculture (USDA) estimates that retailers lose \$15 billion each year.³ The below charts from the USDA article “Supermarket Loss Estimates for Fresh Fruit, Vegetables, Meat, Poultry, and Seafood and Their Use in the ERS Loss-Adjusted Food Availability Data” quantify the percentage loss of various fruits and vegetables between 2005 and 2006 in supermarkets show that a majority items are wasted. For

² Gunders, Dana. 2012. *Wasted: How America is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill*. Issue Paper, Natural Resources Defense Council, 4-26. <http://www.nrdc.org/food/files/wasted-food-ip.pdf>.

³ Gunders, *Wasted*, 10

an example on average 54.9% of papayas and 63.9% of mustard greens in supermarkets go to waste.

Supermarket loss estimates for fresh fruit

Fruit	2005	2006	2005-06 percentage- point change	2005-06 average
	<i>Percent</i>		<i>Number</i>	<i>Percent</i>
Papayas	58.7	51.0	-7.7	54.9
Apricots	37.5	32.6	-5.0	35.1
Honeydew melons	20.9	24.6	3.7	22.8
Tangerines	19.5	21.4	1.9	20.4
Pears	19.7	15.4	-4.3	17.6
Plums	20.7	14.0	-6.7	17.3
Watermelons	18.7	14.9	-3.8	16.8
Pineapples	16.8	12.5	-4.3	14.6
Mangoes	21.2	7.7	-13.5	14.5
Grapefruits	12.9	12.8	-0.1	12.8
Kiwis	15.7	9.6	-6.0	12.7
Cantaloups	11.1	13.3	2.3	12.2
Peaches	14.8	9.1	-5.7	11.9
Oranges	12.8	10.3	-2.5	11.6
Strawberries	10.0	9.5	-0.4	9.8
Avocados	9.7	9.0	-0.7	9.3
Apples	9.5	7.8	-1.7	8.6
Limes	10.9	5.7	-5.2	8.3
Bananas	9.4	6.5	-2.8	8.0
Grapes	8.1	7.1	-1.0	7.6
Lemons	8.1	5.9	-2.2	7.0
Cranberries	7.1	4.8	-2.3	6.0
Blueberries	5.9	4.6	-1.3	5.2
Cherries	2.8	4.9	2.1	3.9
Average	10.7	8.4	-2.3	NA ¹

¹When the impact of incorporating the new estimates on ERS Loss-Adjusted Food Availability data was analyzed, the estimate of the overall average supermarket loss for fresh fruit was 11.4 percent.

Source: Adapted from the Perishables Group final report to ERS, September 28, 2007.

FIGURE 1

Supermarket loss estimates for fresh vegetables

Vegetable	2005	2006	2005-06 percentage- point change	2005-06 average
	<i>Percent</i>		<i>Number</i>	<i>Percent</i>
Mustard greens	66.6	60.7	-5.9	63.6
Escarole/endive	47.6	47.8	0.2	47.7
Turnip greens	39.1	42.9	3.8	41.0
Kale	42.1	36.3	-5.8	39.2
Collard greens	42.8	32.2	-10.6	37.5
Okra	22.9	25.9	2.9	24.4
Eggplant	21.5	21.2	-0.3	21.3
Radishes	22.4	19.6	-2.8	21.0
Artichokes	19.8	18.8	-1.1	19.3
Brussel sprouts	20.1	17.4	-2.8	18.8
Snap beans	19.2	17.9	-1.2	18.6
Spinach	14.4	14.4	0.0	14.4
Sweet potatoes	15.2	13.2	-2.0	14.2
Cabbage	16.4	11.8	-4.6	14.1
Cauliflower	12.9	15.1	2.1	14.0
Romaine and leaf lettuce	14.6	13.3	-1.3	13.9
Tomatoes	14.4	12.0	-2.3	13.2
Mushrooms	14.2	11.2	-3.1	12.7
Squash	12.5	12.4	0.0	12.5
Broccoli	12.5	11.4	-1.0	12.0
Pumpkins	12.7	9.8	-2.9	11.2
Onions	12.0	7.5	-4.5	9.8
Asparagus	10.8	8.0	-2.8	9.4
Head lettuce	9.1	8.3	-0.8	8.7
Bell peppers	9.7	5.8	-3.9	7.8
Garlic	9.8	5.0	-4.8	7.4
Potatoes	7.4	5.6	-1.7	6.5
Cucumbers	6.5	5.7	-0.8	6.1
Carrots	6.2	4.1	-2.2	5.1
Celery	5.9	4.3	-1.5	5.1
Sweet corn	0.6	0.6	0.0	0.6
Average	10.3	8.4	-1.9	NA ¹

¹When the impact of incorporating the new estimates on ERS Loss-Adjusted Food Availability data was estimated, the overall average supermarket loss or shrinkage for fresh vegetables was 9.7 percent.

Source: Adapted from the Perishables Group final report to ERS, September 28, 2007.

FIGURE 2

Dana Gunders of the Natural Resources Defense Council (NRDC) conducted an in depth study of food waste in the United States. Her article, “Wasted: How America is Losing Up to 40 Percent of its Food from Farm to Fork to Landfill,” identifies that “through their influence both up and down the supply chain, retailers actually are responsible, at least in part, for a much bigger proportion of total losses.”⁴ The retail culture regarding food is incredibly selective. Supermarkets maintain the idea that stocked shelves are more appealing to customers. In his book *Waste*, Tristram Stuart explains that “Full shelves give the impression of infinite abundance—an illusion which remains central to expectations of choice in today’s consumer culture.”⁵ Stuart further explains that stores would rather over-order product than have too little of that product. Even if food, and money in this case, goes to waste because there is too much supply for that day’s demand, customers will frequent a store with plenty of options. Moreover, a shopper prefers an abundant display because no one wants to buy the last of a product.⁶

Supermarket Emphasis on Appearance Food retailers have also set high standards for the appearance of the products. As discussed in the book *American Wasteland* by Jonathan Bloom, “food porn” is commonly favored by shoppers.⁷ As supermarkets beautify itself with grand displays, customers now prefer what the products look like over what they taste like. As an example, the produce we are accustomed to is often large and without blemishes, but the taste is lacking. Food is often wasted if it does not appear perfect. For example, produce which is damaged in some regard, whether it be bruised, blemished or of the wrong size, will be thrown

⁴ Gunders, *Wasted*, 10

⁵ Stuart, Tristram. 2009. *Waste: Uncovering the Global Food Scandal*. New York: W.W. Norton & Company, Inc., 27

⁶ Bloom, Jonathan. 2010. *American Wasteland: How America Throws Away Nearly Half of Its Food (and What We Can Do About It)*. Da Capo Press., 156

⁷ Bloom, *American Wasteland*, 155

away by supermarkets. This is especially true in cases of bundled produce packages. If one piece of produce in a package is damaged, the whole pack will be disposed of even if the others are seemingly perfect.⁸ Depending on the distribution system, the produce might never even make it to the shelves if it is not up to the store's standards.

Dry goods are also susceptible to being wasted. Items will be disposed of if the packaging is dented or ripped. It is also common for store to throw away goods with seasonal or promotional packaging once the events are over. Additionally, it is estimated that 19,000 new products hit the shelves each year, and those which are not popular are disposed.⁹

As stores are very conscious of how customers perceive the freshness of their products, some supermarkets instruct their staff members to dispose of any product which is two or three days away from the sell-by date. Later in this chapter the confusion surrounding expiration dates will be explored, but these disposed products are still safe to eat. In fact, it is not illegal to sell products after the sell-by date but store managers fear that if customers find an item close to expiration or the sell-by date "their image of carrying fresh products will be damaged."¹⁰

Emphasis on Customer Convenience Supermarkets often have sections which feature convenience food items such as pre-cut produce, ready-made dinners, premade sides at the deli counter, or a salad bar. These specialty items follow the same principle of produce in that there is always more in stock than there is a demand. Moreover, stores continue to stock items until the store closes which attributes to the waste.

⁸ Bloom, *American Wasteland*, 168

⁹ Gunders, *Wasted*, 10

¹⁰ Gunders, *Wasted*, 10

There are rules surrounding ready-made products which leads to its eventual disposal. As an example, stores have a policy of how long their rotisserie chickens can be on the shelf. In one particular store exemplified by Bloom, the chickens are marked down in price after being shelved for three hours and are disposed of after four. There is nothing wrong with these chickens and they are safe to eat after a number of hours if they are kept at the right temperature. The standards for the amount of time a product stays on the shelf really depends on the type of product as some products can hold up in quality longer than others.¹¹

The issue of waste comes back to the fact that there is too much stock compared to the number of buyers. This is especially problematic in buffet-style settings. Stores which offer salad bars or self-serve hot food continually replenish the items to keep up the appearance of infinite food. However, once the stores close the food has to be discarded because of health-code regulations. Germs could have easily been spread throughout the day as people utilized the self-serve stations.¹²

Depending on the supermarket, some of the food is repurposed. For example, the rotisserie chickens can be transformed into chicken salad, or day-old bread is turned into stuffing.¹³ The issue here is that not every store has the staff for transforming food items.¹⁴

Food Service Industry The food service industry is another commercial entity guilty of food waste. Restaurants in particular contribute to food waste at every step of their production and supply chain. The numbers to assess restaurant food waste has a wide range, but it is

¹¹ Bloom, *American Wasteland*, 175

¹² Bloom, *American Wasteland*, 174

¹³ Bloom, *American Wasteland*, 176

¹⁴ Gunders, *Wasted*, 11

estimated that 30 to 70 percent of restaurant food is wasted.¹⁵ Bloom explains that restaurant waste can be attributed to food preparation and diners' habits. Efficiency is key to the success of restaurants, thus there is little emphasis on reducing food waste during preparation. Restaurants order whole or pre-cut materials. If restaurants butcher their own meat or trim their own produce, there is waste associated here. If restaurants are ordering the pre-cut materials, the wasted trimmings occur at a different point of the supply chain. Additionally, many kitchens over-order food. Larger chains are able to keep track of what sells and how much product they need thus they are able to order food accordingly.¹⁶ Smaller restaurants do not necessarily keep track of how much of what product is needed which leads to which leads to excess food orders.¹⁷

Similar to supermarket chains, restaurants must also provide their customers with fresh and diverse options because that is what customers expect from them. Restaurants must be picky about the ingredients they use so their customers get the highest quality meal. Additionally, many restaurants have large menus to attract a broad range of customers. This is crucial to the competitiveness of a restaurant. However, bigger menus require a larger variety of products and a large quantity of products which contributes to food waste, as it is difficult to keep track of such a large stock.¹⁸

To keep a competitive edge, restaurants also offer large portions at a reasonable price. Over the past thirty years portion sizes have increased to the point that our servings are two to eight times larger than the USDA and FDA serving sizes.¹⁹ Products in supermarkets and meals

¹⁵ Bloom, *American Wasteland*, 120

¹⁶ Bloom, *American Wasteland*, 124

¹⁷ Bloom, *American Wasteland*, 123

¹⁸ Bloom, *American Wasteland*, 124

¹⁹ Nestle, Marion, and Lisa R Young. 2003. "Expanding Portion Sizes in the US Marketplace: Implications for Nutrition Counseling." *Research and Professional Briefs* 103 (2): 231-234. <http://portionteller.com/pdf/portsize.pdf>, 231

from restaurants and fast food chains have increased in size that customers now expect these proportions. However, large portion sizes correlate to food waste. It is estimated that 17% of a meal goes to waste. Diners leave food on their plates because portions are too big and they often receive unwanted side dishes.²⁰ Sometimes it is even the case that food is wasted because diners do not enjoy their meal. Even if the meal is left unfinished, many people do not opt to take home leftovers. In fact, 55% of people do not take home leftovers according to Brian Wansink, the director of the Cornell University Food and Brand Lab. This percentage stems from a number of personal reasons. Some people do not like leftovers. Others see accepting leftovers as a sign of being in need. At some restaurants, servers are instructed to not mention wrapping up leftover food because the restaurant does not want to make patrons feel guilty for not finishing their food.²¹

Nontraditional restaurants such as buffet-style restaurants and fast-food chains are large contributors to food waste as well. Like supermarkets, buffet restaurants operate under the 'land of the plenty' mentality. Buffets have many food options and people overfill their plates which go uneaten. Moreover, most establishments have the rule that leftovers cannot be taken home, so the last stop for these meals is the trash. Similar to supermarket self-serve stations, many buffets also continually replenish the trays which increases the amount of food produced, and later disposed. Unfortunately, health codes prohibit buffet food to be donated because germs can spread through buffets, thus this food is thrown away.²²

²⁰ Bloom, *American Wasteland*, 125

²¹ Bloom, *American Wasteland*, 143

²² Bloom, *American Wasteland*, 137

Fast-food chains also contribute to food waste because of each company's set of quality standards. Waste in this industry can be attributed to mistakes in taking orders as well as customers who change their minds after an order has been placed. If an incorrect order is taken, that order is tossed and the new one is made. If a customer wants to amend an already placed order, the company policy dictates that the item has to be made from scratch instead of removing or adding condiments to the already made item.²³

Many fast-food chains also put time limits on how long a pre-made item can qualify for sale. Additionally, most chains pre-make some items which go right into the trash once the time limit is up. As an example, McDonald's, perhaps the world's most recognized fast-food chain, allows cooked chicken patties to sit for an hour, fish patties to sit for thirty minutes, and burger patties and chicken nuggets to sit for twenty minutes before they have to be discarded. French fries can only sit out for seven minutes before heading to the trash. According to the National Restaurant Association (NRA) up to 10 percent of the food made by fast-food chains are thrown away because the items have reached their allotted life-span. These strict time limits are in place because after that period of time, the quality of the product dwindles in taste and texture.²⁴ Unfortunately, fast food chains have pre-made items to maintain their speedy serving rate, but these items are tossed just as quickly as they are made.

Industrial Food Sector The high expectations of consumers and the rigid standards of the commercial sector directly affect the industrial food sector. This section will specifically look at

²³ Bloom, *American Wasteland*, 122

²⁴ Bloom, *American Wasteland*, 122

agricultural practices. Food loss is seen at every stage of agricultural production including farming, harvesting, processing and distribution.

At the initial stage of growing produce, farmers tend to overplant their land. This is to ensure that they will have enough product to meet demand, and it is a type of insurance policy if there is an incidence of pests, disease or poor weather conditions.²⁵ When it comes time to harvest the produce, often entire fields go untouched for a number of reasons. In some cases, there is no demand for a particular item thus it is left in the field. Other times, there is a demand for the product but the market price is so low that it would be more expensive to harvest, process and ship it then to leave it in the field.²⁶ There are also disease outbreaks amongst certain crops which means more produce left in the field. Additionally, labor shortages result in un-harvested crops.²⁷ It is estimated that between 1994 and 1996 7% of crops were not harvested in the United States.²⁸ Even with a strong labor force, some produce is left in the field. Many laborers are paid by the piece or by weight of what they pick, thus they pick crops quickly which leaves good produce behind.²⁹ Produce is also harvested based on appearance. Bloom uses the example of cucumbers. Cucumbers are left in the field if they have blemishes and spots which are caused by a lack of sun, or if they have small cracks which give them a shorter shelf life. They are also un-harvested if they are curved, which makes it difficult to pack and stack.³⁰ This information is taken from Parker Farms in Virginia. Granted, un-harvested produce does not contribute to

²⁵ Gunders, *Wasted*, 7

²⁶ Bloom, *American Wasteland*, 109

²⁷ Gunders, *Wasted*, 7

²⁸ Kantor, Linda Scott, Kathryn Lipton, Alden Manchester, and Victor Oliveira. 1997. "Estimating and Addressing." *Food Review* 2-12.,4

²⁹ Bloom, *American Wasteland*, 104

³⁰ Bloom, *American Wasteland*, 93

physical food waste as the crops decompose back into the field returning nutrients, however by growing these crops just to leave them untouched is a waste of resources namely water, energy and chemicals.³¹

The processing stage of produce is also a large source of food waste. “Culling” is a common practice after the harvest of produce. Culling is the “removal of products based on quality or appearance criteria, including specifications for size, color, weight, blemish level and Brix (measure of sugar content)” meaning that employees and machines sort through the batch of produce and sort out any item which does not meet industry standards.³² Returning to Bloom’s cucumber example which comes from Parker Farms in Virginia, the owner of the farm estimates the 75% of the un-harvested cucumbers are still edible, but they do not pass the test for physical reasons.³³ In recent years consumers’ perception of produce has dramatically changed. As Bloom explains poignantly, “We’ve come to believe that perfect, uniform produce is normal.”³⁴ Consumers have lost touch with what produce looks like straight from the field, and supermarkets and restaurants are facilitating these false ideals but contracting deals which state that each individual item must be perfect with produce suppliers.

Once food producers have reached the point in the supply line where the produce has passed the test, there is still the risk of food waste from trimming and distributing the produce. From a convenience standpoint, supermarkets provide their customers with precut produce. Producers have facilities where produce is cut and packaged, and in some cases slightly damaged items are used. However, at the processing level there is more food waste when these items are

³¹ Gunders, *Wasted*, 7

³² Gunders, *Wasted*, 8

³³ Bloom, *American Wasteland*, 93

³⁴ Bloom, *American Wasteland*, 97

trimmed. Moreover, once produce is cut or peeled, it spoils far quicker than when it is intact, thus decreasing its lifespan and creating more food waste in the long run.³⁵

The distribution level of the food industry also contributes to food waste. When food is transported long distances, it has to be properly refrigerated. There are some cases in which the trucks malfunction and lose the ability to keep the food at the right temperature. In terms of imported foods, the shelf life diminishes and also faces temperature issues when out on the docks for too long. These shipments might also be rejected by the buyers if it does not reach the destination in time or if the produce is close to expiring. And although leftover or rejected items are donated to food banks, sometimes it is turned away because they do not have the space or need for the items.³⁶

Households Although consumers' demand for perfect produce affects the food wasted by the retail and industrial sectors of food, consumers on their own waste food. Households waste food for a number of reasons, which Gunders outlines in her NRDC article. Individuals have lost sense of the value of food. We are accustomed to cheap and plentiful food options to the point where we no longer make it a point to utilize every last piece of food. Because we consider food to be infinite, food is wasted from it simply going bad. It is often the case that food is not stored properly or it gets pushed to the back of the fridge or cabinet where it is forgotten.³⁷ Additionally, poor planning, impulse buys and bulk purchases contribute to food waste. Ingredients go to waste if they have few uses, and buying more products during one shopping trip results in food waste.³⁸

³⁵ Gunders, *Wasted*, 9

³⁶ Gunders, *Wasted*, 9

³⁷ Gunders, *Wasted*, 12

³⁸ Gunders, *Wasted*, 13

Along with these wasteful habits, lack of understanding surrounding food expiration labels is a large contributor to food waste. In general, the dates on food items are not regulated by any federal or state body, rather they are printed by manufacturers to give consumers an idea about freshness. However, consumers misinterpret the dates as safety indications although most items are safe past the printed dates. Additionally, people misinterpret what the dates mean because of confusing labeling. There is a difference between 'sell-by,' 'use-by,' 'best-by' as well as other terms but there is no clear or standard definition for consumers. Thus, consumers air on the side of caution and dispose of the item when the date has come.³⁹

³⁹ 2013. "Your Scraps Add Up." *nrdc.org*. March.http://www.nrdc.org/living/eatingwell/files/foodwaste_2pgr.pdf.

Chapter Two:

History of Food Consumption and Production

The roots to our food system and the historic patterns of our consumption habits are vital to understanding our current issue of food waste. This chapter will examine an environmental history of food production in the United States. Additionally, this chapter will also highlight the evolution of our attitude to food and our consumption habits over course of United States history.

When the first settlers arrived to the United States they were faced with many uncertainties including but not limited to, where would they sleep, with who and what else would they be sharing this new territory, and what was for dinner? Although the settlers tried to continue to eat the way they did in England, the provisions of the New World did not provide them with this luxury. Settlers disproved of Native American eating habits and thus attempted to plant wheat because they were accustomed to the grain. However, these crops often failed and with this, settlers incorporated native corn into their diets and the colonial period was a time when people ate what was available based on the environment of the land.⁴⁰

The settlers lived in an era where people did not live to eat, rather they ate to live. There was an intrinsic value placed in food because individuals had to rely on themselves for their provisions. As the decades went by the colonists learned how to farm the new land and an agricultural system was developed. Beginning in 1775, farmers had the opportunity to

⁴⁰ Wallach, Jennifer Jensen. 2013. *How America Eats: A Social History of U.S. Food and Culture*. Lanham: Rowman & Littlefield Publishers Inc., 17

experiment with more land and a variety of crops.⁴¹ The concept of owning land became popularized with public land sales. Although there was already plenty of land available, the United States continued to acquire territory west of the colonies. Each phase of Westward Expansion created new economic opportunities and changed the landscape of American agriculture.

As time passed, particular areas became more urbanized which increased the demand for agricultural goods. Additionally, new technologies came into play which increased agricultural efficiency. Although New England and the Mid-Atlantic states had a strong agricultural system, an increased product demand forced these farmers to adapt to more commercial practices.⁴² The Old Northwest and Old Southwest territories (currently Wisconsin, Michigan, Illinois, Indiana, Ohio, Kentucky, Tennessee, Mississippi, and Alabama) allowed for people to cultivate untouched land for farming and cotton production.⁴³ Farmers in these new regions were competitors of New England and Mid-Atlantic farmers as they had access to more nutrient-rich soil, whereas the soils of the original colonies had reached their peak of productivity.⁴⁴ The Northwest Territory was a strong producer of wheat, corn, whiskey and cattle.⁴⁵ The Southwest Territory produced tobacco and later cotton, which would become an incredibly valuable crop to the southern economy and would also shape the culture of plantations in the region.⁴⁶ New technologies such as the plow,

⁴¹ Hampe, Edward C, and Merle Wittenberg. 1964. *The Lifeline of America: Development of the Food Industry*. New York: McGraw-Hill Book Company., 38

⁴² Hampe and Wittenberg, *The Lifeline of America*, 42

⁴³ Hampe and Wittenberg, *The Lifeline of America*, 39

⁴⁴ Hampe and Wittenberg, *The Lifeline of America*, 43

⁴⁵ Hampe and Wittenberg, *The Lifeline of America*, 43-44

⁴⁶ Hampe and Wittenberg, *The Lifeline of America*, 45

seed drill, mechanical reaper and threshing machines also led to increased agricultural production in the 1800s.⁴⁷

Other territory purchases brought wealth to the settlers who continued west. The Louisiana Purchase encompassing the middle states brought prosperity to those involved in the fur trade. Inhabitants of the acquired Oregon Territory and California struck it rich during the gold rush.⁴⁸

The United States experienced a number of transformative periods in terms of its agricultural landscape, but two eras in particular were critical to the state of our current agricultural system. The first era was from 1897 to the 1920s when farms expanded because of new technology and increased demand. Before World War I the United States produced enough food to export as a source of income. However, with the start of the war, food production was redirected to the war effort. In either case, there was a high demand for food production. However, as men left for the war, the population shrank and reduced the number of laborers for food production. Additionally, horses once used for farms were used in the war effort.⁴⁹ With little labor and high demand, technology entered the farm scene. Since the late 1880s, engineers had begun designing and building tractors, a now vital piece of farm machinery. While farmers were reluctant to incorporate the tractors into their farming systems, the lack of manpower and horsepower and the marketing tactics of tractor manufacturers led to the adoption of tractors. Between 1916 and 1919 tractor sales went from 50,000 to 136,000 tractors.⁵⁰ Aside from advanced machinery, innovations in botany also contributed to agricultural growth. Experiments

⁴⁷ Hampe and Wittenberg, *The Lifeline of America*, 51-52

⁴⁸ Hampe and Wittenberg, *The Lifeline of America*, 40

⁴⁹ Fitzgerald, Deborah. 2003. *Every Farm a Factory*. New Haven: Yale University Press., 96

⁵⁰ Fitzgerald, *Every Farm a Factory*, 100

by public and private institutions were done on seeds to create new breeds of staple crops such as wheat and corn, and modify crops such as tomatoes to be bigger.⁵¹ Additionally, methods to conserve soil were perfected. By the 1920s farms got bigger as a result of small farms increasing in size, or multiple farms merged.⁵²

The second era which led to an agricultural boom was the 1940s. Because of the technological advances made in prior years, production skyrocketed. Between 1939 and 1944 production doubled from the output levels of 1919 to 1939.⁵³ Between 1940 and 1960 agricultural output increased at an unprecedented rate. Along with increased demand for food from World War II, this period experienced the industrialization of agriculture from the emergence of large and specialized farms.⁵⁴ Farms increased in size as one farm acquired another, or from cooperatives forming. Additionally, farms tended to produce few crops versus a large variety. In terms of crop options, advancements in crop manipulation continued and farmers had access to quick-growing crops.⁵⁵ From the 1940s to 1960s there were advancements in chemical fertilizers which also increased yields.⁵⁶ Farmers also had the luxury of advanced harvesting machinery which made collecting crops efficient.

Agriculture was a flourishing industry in the young United States, but even with increased food production there was still a value placed in the sacredness of food moving into the nineteenth and twentieth centuries. The concept of careful food management in the household was encouraged by magazines, textbooks and even cookbooks. Miss Beecher's *Housekeeper and*

⁵¹ Hampe and Wittenberg, *The Lifeline of America*, 73

⁵² Fitzgerald, *Every Farm a Factory*, 107

⁵³ Hampe and Wittenberg, *The Lifeline of America*, 73

⁵⁴ Hampe and Wittenberg, *The Lifeline of America*, 74

⁵⁵ Hampe and Wittenberg, *The Lifeline of America*, 76

⁵⁶ Hampe and Wittenberg, *The Lifeline of America*, 76

Healthkeeper's 1873 cookbook, which was published in the United States, makes many references to the value of conserving food. Her recipes suggest reusing cooked meat in soup, and leftovers such as potatoes or bread to make "the most economical breakfast dish." In Marion Rombauer's famous cookbook, *The Joy of Cooking*, which was published in 1931, an entire chapter is dedicated to recipes for leftover food. While this 'thrifty' mentality stems from the desire to save money, the principle remains that food is not something that should be wasted.⁵⁷

During both World War I and World War II food was rationed to provide food security both at home and abroad. These periods in United States history were times when food was placed at the highest value and families had no choice but to provide for themselves and their neighbors. During World War II the popularized slogan "Produce and Conserve! Share and Play Square!" was instrumental in using private home gardens for the public good.⁵⁸ The slogan encouraged individuals to plant produce in gardens, learn how to can their foods, share their harvest with neighbors and avoid black market products. Waste was not an option during the war and this point was made clear in a "Produce and Conserve! Share and Play Square!" informational poster that read, "Cut waste-use every crumb, every drop."⁵⁹

This era of conscientious consumption came to a close with the 1950s. Americans were beginning to prosper again, and a new consumer culture came to be. It was during this decade that food waste started to rear its ugly head, as a new "food regime" was established. Large scale agriculture gained popularity in the United States. New policies and technological advancements formed "new production practices, farming approaches, production technologies and food

⁵⁷ Evans, David, Hugh Campbell, and Anne Murcott. 2012. "A Brief Pre-history of Food Waste and the Social Sciences." *The Sociological Review* 5-26., 13

⁵⁸ Bently, Amy. 1998. *Eating for Victory*. Urbana: University of Illinois Press., 37

⁵⁹ Bently, *Eating for Victory*, 59

commodities.” A notable policy instructed farmers to produce as much as possible regardless of the market for that product. This policy led to an enormous overproduction of food. In 1954 twenty-five percent of the grain produced in the United States was exported.⁶⁰

The revolution of agriculture led to surpluses in the United States. Now there were more options for consumers and there was simply too much product to meet demand. In fact, according to Edward C. Hampe Jr. and Merle Wittenberg, authors of *The Lifeline of America*, reference “production in excess of demand [as] the chief cause of America’s surplus problem.” Producing without demand unfortunately leads to waste. However, farmers cannot switch from crop to crop with our monoculture agricultural system. Instead they must continue to produce their primary crop and hope to profit in some way.⁶¹

Government involvement in food production began the era in American history in which “food security was formally constituted as a policy concern that justified state investment into agricultural productivity; and food rapidly became cheap and abundant.” Essentially, the 1950s indicated the start of moving past food scarcity into a period of food abundance. More and more food was being produced over the subsequent decades, and moving into the Cold War another specific food regime occurred. Characterized by “large-scale corporate investment in agriculture” and emphasis on turning a profit on food production, although food was inexpensive, popularized food processing. Fast food chains emerged, food products were branded, and “supersizing” occurred. Additionally, advancements in technology assisted in the mass production of food. These technologies emphasized “production, efficiency and excess” so food

⁶⁰ Evans, Campbell, and Murcott. 2012. "A Brief Pre-history of Food Waste," 14

⁶¹ Hampe and Wittenberg, *The Lifeline of America*, 80

waste was a non-issue for this “era of celebration of massively excessive food production.”⁶² At this point in history, food became so abundant and inexpensive there was no regard for food waste. Chapter Three of this thesis will go into greater detail regarding the agricultural policies post-World War II and into the present day Farm Bill. Even today we are still in a state of surplus food, low prices for staple goods supported by government policies, and food waste.

⁶² Hampe and Wittenberg, *The Lifeline of America*, 15

Chapter Three:

Politics of Food

As mentioned in Chapter Two, the industrialization of agriculture stemmed from advancements in technology, national events such as World War I and World War II, and policy choices. This chapter will examine the policies implemented during the twentieth century, with an emphasis on World War II and post-World War II policies, which enhanced our agricultural system which output goods to the point of surplus.

A current hot-button topic of debate in the United States is the Farm Bill. However, this contentious piece of policy has a long history. The original versions of the Farm Bill were meant to reduce the volume of food produced because there was simply too much being produced. Leading into World War I there was a high demand for food, thus prices increased as did supply. During the 1910s farmers profited from this demand.⁶³ However, the decades of the 1920s and 1930s did not require the same volume of food as the war years. Thus the government intervened with the policies of the 1930s to reduce the food supply and assist farmers who were losing money.

The first 'Farm Bill' was crafted in 1933.⁶⁴ Known as the Agricultural Adjustment Act (AAA), the policy was formed at the start of the Great Depression as a New Deal program to support hard-hit farmers. The act subsidized farmers who limited their production of staple

⁶³ Henderson, Jason, Brent Gloy, and Michael Boehlje. 2011. "Agriculture's Boom-Bust Cycles: Is This Time Different?" *Economic Review* 83-105., 85

⁶⁴ Dimitri, Carolyn, Anne Effland, and Neilson Conklin. 2005. *The 20th Century Transformation of U.S. Agriculture and Farm Policy*. Economic Information Bulletin, United States Department of Agriculture. file:///C:/Users/user/Downloads/60b7d51e844f9326d0.pdf., 9

crops. The idea was to raise the price of the crop back to the levels of 1909-1914 when Americans were more prosperous.⁶⁵ This subsidy was supported by a processing tax on the staple crops which would later transfer to the consumers.⁶⁶ In 1936 the AAA was found unconstitutional by the Supreme Court because the right to regulate agriculture is not extended to Congress.⁶⁷ The AAA was replaced with the Soil Conservation and Domestic Allotment Act.⁶⁸ This policy was aimed at maintaining soil quality. Because advanced farming technology and techniques, as well as an increase in output had taken a toll on soil, farmers were paid by the government to reduce output and grow crops which did not have negative effects on soil health.⁶⁹ After the Soil Conservation and Domestic Allotment Act had a moderate effect, Congress set forth a revised and constitutional AAA. The Agricultural Adjustment Act of 1938 still assisted farmers financially by paying farmers to produce less but they were paid for the minimum price of the crop and what it cost to produce the crop. Additionally, this version of the AAA gave the Secretary of Agriculture the right to limit which "surplus crop" was produced and sold.⁷⁰

The 1938 AAA was overshadowed by the start of World War II. Farmers were no longer encouraged to limit production as the war created a demand for high volumes of food. Food production jumped 25% between 1939 and 1945, and in 1943 the price of food was twice as high before the war. Farmers however took a page from history and "feared that there would be another agricultural depression once the war ended," thus they wanted some form of insurance

⁶⁵ *Encyclopaedia Britannica Online*. n.d. "Agricultural Adjustment Administration (AAA)." <http://www.britannica.com/EBchecked/topic/9551/Agricultural-Adjustment-Administration-AAA>.

⁶⁶ Duscha, Julius. 1964. *Taxpayers' Hayride*. Boston: Little, Brown and Company, 49

⁶⁷ Duscha, *Taxpayers' Hayride*, 50

⁶⁸ *Encyclopaedia Britannica Online*. n.d.

⁶⁹ Duscha, *Taxpayers' Hayride*, 50

⁷⁰ Duscha, *Taxpayers' Hayride*, 51

against another harmful economic downturn.⁷¹ Congress drafted legislation to appease the concerns of the farmers which resulted in the Agricultural Act of 1949. The significance of the 1949 act is that every Farm Bill later drafted is based on the provisions of the 1949 act.⁷² This act ensured “fixed-price supports and acreage allotments,” meaning that farmers would still be supported by the government while they produced goods.⁷³ Two amendments were made to the Agricultural Act, the first in 1954 and the second in 1956. The idea behind 1954 addendum was to get the government to pull out of agricultural production.⁷⁴ Government support of agriculture would be flexible with price changes of the goods.⁷⁵ The 1956 changes were intended for conservation measures. This established the Soil Bank, where the government paid farmers to let their land regenerate itself by halting crop production for a predetermined amount of time.⁷⁶ Unfortunately, this program only lasted two years.⁷⁷ However, the intended effects of the 1954 change was not accomplished. Support was flexible but the agricultural policies really reflected the support from the 1930s.⁷⁸

Because farmers were paid to not put crops on the market, the surplus products piled up. Over the course of the 1950s the agricultural policies resulted in \$10 billion worth of excess crops. As mentioned in Chapter Two, the technological revolution of the twentieth century increased the amount of crops grown and harvested. Between advanced machinery, fertilizer and seed

⁷¹ Duscha, *Taxpayers' Hayride*, 54

⁷² Bellemare, Marc F, and Nicholas Carnes. 2013. *Why Do Members of Congress Support Agricultural Protection?* Duke University, 1-40. http://mpra.ub.uni-muenchen.de/47629/1/MPRA_paper_47629.pdf., 6

⁷³ Dimitri, Effland, and Conklin. *The 20th Century Transformation of U.S. Agriculture and Farm Policy.*, 10

⁷⁴ Duscha, *Taxpayers' Hayride*, 60

⁷⁵ Dimitri, Effland, and Conklin. *The 20th Century Transformation of U.S. Agriculture and Farm Policy.*, 10

⁷⁶ Duscha, *Taxpayers' Hayride*, 64

⁷⁷ Dimitri, Effland, and Conklin. *The 20th Century Transformation of U.S. Agriculture and Farm Policy.*, 10

⁷⁸ Duscha, *Taxpayers' Hayride*, 60

varieties of the 1950s and government subsidies on agriculture, production per acre jumped by a third between 1950 and 1962.⁷⁹

The agricultural policies throughout the 1950s and 1960s tremendously affected the level of output by farmers. Often these policies had contradictory goals; some policies were intended to limit production and conserve soil, while other policies subsidized production and then paid farmers for the excess goods which went unsold and then straight into storage. The government has continued to support farmers because farmers have claimed that they need it to prosper. During the 1950s there was the fastest move from farms into urban areas than in any other decade.⁸⁰ From the 1950s and 1960s the number of farms decreased to the point where there were fewer farms, but the remaining farms were larger. The government was supporting 8% of the total population in the United States with \$5 billion a year.⁸¹ Farmers were supported at every level of production. The government assisted farmers in leasing land to produce crops and support livestock. Farmers were subsidized to adopt new fertilizers which would benefit the soil. Farmers were even financially supplemented to produce crops which exceeded domestic demand to then be sold internationally. As an example, wheat producers received payments from the government which were above the world price market for wheat. The idea behind this policy was to encourage producers to produce wheat to be sold internationally.⁸² For the crops which were produced in such excess that domestic and foreign demand did not need it, the

⁷⁹ Duscha, *Taxpayers' Hayride*, 62

⁸⁰ Duscha, *Taxpayers' Hayride*, 231

⁸¹ Duscha, *Taxpayers' Hayride*, 233

⁸² Duscha, *Taxpayers' Hayride*, 238

government would also pay for the storage of excess crops. Between 1953 and 1960 the Agricultural Department diverted \$2.3 billion to store and manage excess crops.⁸³

Agriculture continued to grow into the beginning of the 1970s and exports rose until the oil crisis of 1973 to 1975.⁸⁴ During this decade three federal policies were established. The first was the 1970 Agricultural Act which focused on rural development. The second was the 1973 Agricultural and Consumer Protection Act which “introduced target prices and deficiency payments to replace price supports, coupled with low commodity loan rates, to increase producer reliance on markets and allow for free movement of commodities at world prices.” The third was the 1977 Food and Agriculture Act which was the first time food stamps and product distribution was included in the Farm Bill.⁸⁵ While agriculture picked up slightly after that period, the industry was not as fruitful pre-crisis.

The 1980s also saw a dip in agricultural prosperity as exports were low.⁸⁶ Because of this downturn, the government intervened with the 1985 Food Security Act. This act allowed for farmers to repay their loans at a lower rate if market prices fell to in turn reduce government-owned excess grain.⁸⁷ By the end of the 1980s exports increased again. The 1990s was another semi-prosperous decade for exports and during the mid-1990s exports totaled to \$60 billion even when production was slightly low. However, the financial crisis in Asia at this time lowered the demand for exports which affected the prosperity of farmers. It was not until the early 2000s that exports and prices grew.⁸⁸ To supplement the issues of the 1990s, the Federal Agriculture

⁸³ Duscha, *Taxpayers' Hayride*, 129

⁸⁴ Henderson, Brent and Boehlje. "Agriculture's Boom-Bust Cycles," 88

⁸⁵ Dimitri, Effland, and Conklin. *The 20th Century Transformation of U.S. Agriculture and Farm Policy.*, 10

⁸⁶ Henderson, Brent and Boehlje. "Agriculture's Boom-Bust Cycles," 88

⁸⁷ Dimitri, Effland, and Conklin. *The 20th Century Transformation of U.S. Agriculture and Farm Policy.*, 10

⁸⁸ Henderson, Brent and Boehlje. "Agriculture's Boom-Bust Cycles," 88

Improvement and Reform Act of 1996 through which the government gave farmers payments “regardless of the quantities they produced or the prices of their crop.” Through general payments instead of payments based on the price or quantity of the crop, the market would “dictate which crops were most valuable” and farmers would be assisted by the government.⁸⁹

The Farm Bill continued to be renewed into the 2000s. In 2002 the new bill continued the provisions of the 1996 bill and also added “countercyclical payments and commodity loan rates.” The 2008 version of the bill built upon the 1996 and 2002 versions, but also included the Average Crop Revenue Election (ACRE) program which acted as insurance for farmers because of the food crisis of 2008.⁹⁰

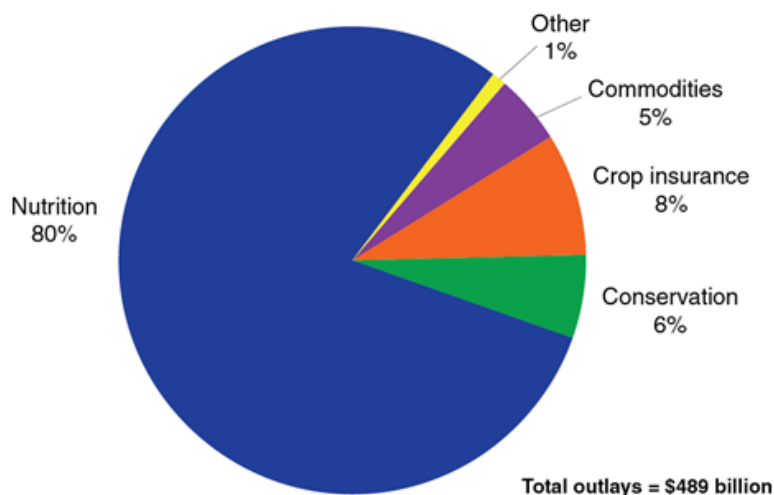
The most recent farm bill was passed in 2014, as each bill is redrafted every five years.⁹¹ The Agricultural Act of 2014 was passed with much controversy, both from the political and public sphere. As seen in the pie chart below, the USDA has laid out a breakdown of the budget distribution for the bill. A majority of the money is distributed to nutrition programs such as the Supplemental Nutrition Assistance Program (SNAP), while the next area of focus is crop insurance.

⁸⁹ Bellemare and Carnes. *Why Do Members of Congress Support Agricultural Protection?*, 7

⁹⁰ Bellemare and Carnes. *Why Do Members of Congress Support Agricultural Protection?*, 7

⁹¹ Ayres, Bill. 2014. "The 2014 Farm Bill: A Reflection After 40 Years of Advocacy." *The Huffington Post*. March 5. http://www.huffingtonpost.com/bill-ayres/the-2014-farm-bill-the-ba_b_4896404.html.

Projected outlays under the 2014 Farm Act, 2014-2018



Source: USDA Economic Research Service using data from Congressional Budget Office, Cost Estimates for the Agricultural Act of 2014, Jan 2014.

FIGURE 3

In terms of the agricultural aspect of the new act, subsidies on staple crops such as corn, wheat, cotton, rice and soybeans will be reduced and the funds will be diverted to crop insurance policies. While it may seem like an 80% emphasis on nutrition is a big step forward for an act which has historically focused on subsidizing farmers, there are problems with the distribution of funds. The SNAP program will see budget cuts in this version of the Agricultural Act. Families who rely on SNAP will see a reduction of \$90 a month which will in term put a stress on food banks and soup kitchens. And while the bill has also allocated money to assist food relief programs, it does not compensate for the increased pressure from individuals now that SNAP has been cut.⁹² Bill Ayres, Co-founder and Executive Director of WhyHunger, describes the issue with the current farm bill in his article “The 2014 Farm Bill: A Reflection After 40 Years of Advocacy”

⁹² Ayres, "The 2014 Farm Bill"

“There is much more in this \$1 trillion bill. While it was not the disaster it could have been, it is a disappointing bill for most food justice and anti-hunger advocates and small farmers. Though their activism succeeded in preventing the worst, it certainly did not succeed in promoting the best. After 40 years doing this work -- and eight farm bills -- I keep hoping that the next farm bill will build a healthier and more just food system for all. If we start now, with anti-hunger advocates, small farmers, conservationists and everyone else at the table, surely we can make more positive changes in 2019.”⁹³

While the terms of these bills over the years have been influenced by a number of farming organizations and lobbyists which has led to controversy in the public sphere, for the purpose of this thesis and chapter the policies have been outlined to connect their existence with the problem of food waste. A number of these acts support farmers to produce as much as they can, whether or not the crops go to exports or storage units. By encouraging the mass production of crops through policy, producers, retailers and consumers have adapted to a culture of surplus which leads to waste.

⁹³ Ayres, "The 2014 Farm Bill"

Chapter Four:

Economic and Environmental Implications of Food Waste

One of the main issues with food waste is that it wastes more than just food. It wastes the resources put into food and it takes a preventable toll on the health of our environment. The EPA study, "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States," concisely explains the economic and environmental issues of food waste by highlighting the negative externalities associated with this problem. According to the document, *negative externalities* are "transaction costs that spill over from an action (e.g., food production or disposal) that can adversely affect society and the environment and that are not incorporated in market prices (e.g., the price of food)." In the case of producing and distributing food, there is a demand for inputs such as water, fuels, chemicals, and land. Food production generally has negative impacts on the environment which includes: air pollution from farm machinery and transportation, water pollution from chemical and nutrient runoff from agricultural production, soil erosion, salinization and nutrient depletion which are caused by irrigation practices.⁹⁴ Additionally, food waste affects landfills which have harmful effects on the environment. This chapter will examine the economic and environmental impact of food waste at every stage of the food chain.

Economics of Food Production: Wasted As seen in Chapter One, food is wasted at every level of the supply chain. However, there is another dimension of waste associated with throwing food away. The production and distribution of food requires energy and valuable resources. By

⁹⁴ Buzby, Jean C, Hodan F Wells, and Jeffery Hyman. 2014. "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States." Economic Information Bulletin, United States Department of Agriculture, ii-33., file:///C:/Users/user/Downloads/eib121%20(1).pdf, 3

throwing food away, we have also wasted the initial inputs to food. These inputs include energy, water, chemicals and land.

The numbers behind our use of energy for food are staggering. As Bloom highlights, agriculture in the United States uses 10% of the nation's energy supply. When combining the production and distribution of food the percentage raises to 17%. Even at home once food is produced we require energy to preserve it. Consider refrigerators; Americans spends more money on refrigeration costs than on any other energy-consuming home necessity (aside from heating and cooling the house). While oil and fossil fuels might not come to mind when thinking of food production, a great deal is needed. Petroleum is used to make fertilizers and to fuel the machines which produce and transport food. Every year, 400 gallons of oil per person is used for food production. That is the same amount of oil which could fuel a car thirty-three times. Additionally, 20% of all the goods shipped in the US is food, which takes a toll on our oil consumption.⁹⁵ To take a more holistic approach to the amount of wasted energy associated with food waste, Amanda D. Cuellar and Michael E. Webber quantified the amount of energy wasted when food is wasted in their article, "Wasted Food, Wasted Energy: The Embedded Energy in Food Waste in the United States." The below chart is a compilation of their research which shows the amount of energy needed to produce food and then how much of that energy is wasted when food is waste. High-ranking energy wasters include grains, vegetables and fruits which waste 32%, 25.3% and 23.4% respectively of the total energy required for production. By wasting these end products, we are losing money and inputs which go into food production.⁹⁶

⁹⁵ Bloom, *American Wasteland*, 19-20

⁹⁶ Cuellar, Amanda D, and Michael E Webber. 2010. "Wasted Food, Wasted Energy: The Embedded Energy in Food Waste in the United States." *Environmental Science and Technology* 6464-6469., 6468

TABLE 7. Energy Embedded in Wasted Food Was 2010 Trillion BTU in 2004 and 2030 Trillion BTU in 2007^a

food category [j]	agriculture [trillion BTU] (i = 1)	transportation [trillion BTU] (i = 2)	food handling [trillion BTU] (i = 3)	food processing [trillion BTU] (i = 4)	total energy, 2004 [trillion BTU]	%wasted	energy lost, 2004 [trillion BTU]	energy lost, 2007 [trillion BTU]
grains [1]	71.4	185	426	155	838	32%	268	271
vegetables [2]	53.5	407	935	178	1580	25.3%	381	379
fruit [3]	26.9	270	619	122	1040	23.4%	234	243
dairy [4]	234	273	627	229	1360	32%	436	441
meat, poultry, fish [5]	778	284	652	238	1950	16%	312	316
eggs [6]	97.1	32.0	73	27	229	31.4%	72.0	72.9
dry beans, peas, and lentils [7]	8.89	6.5	15	5	35.6	15.9%	5.67	5.74
tree nuts and peanuts [8]	0.33	9.8	23	8	40.9	15.9%	6.50	6.58
caloric sweeteners [9]	0	137	314	115	566	30.5%	173	175
fats and oils [10]	0	85.4	196	72	353	33.4%	118	119
total	1270	1690	3880	1150	7980		2010 ± 160	2030 ± 160

^a Wasted dairy represented the greatest amount of energy waste of any food category.

FIGURE 4

An enormous amount of water is also wasted when food is wasted, in fact it is “the largest human use of water.”⁹⁷ Most agriculture is now sustained by irrigation systems, which diverts precious water to growing crops and raising livestock which is then tossed. 90% of freshwater consumption in the United States goes to crops and livestock production.⁹⁸ The article “Saving Water: From Field to Fork” highlights that food production in the United States requires 120 km³ of irrigated water. Approximately 30% of the produced food is thrown out which means 40 trillion liters of irrigated water is wasted. That amount of water can support 500 million people.⁹⁹ What is worse is that once water is used for agriculture, it cannot be reused or recycled for another purpose.¹⁰⁰

One reason why we are able to grow a seemingly infinite amount of crops is because of chemical fertilizers. However, by wasting food we are wasting the chemicals as well as the inputs

⁹⁷ Lundqvist, J, C de Fraiture, and D Molden. 2008. *Saving Water: From Field to Fork-Curbing Losses and Wastage in the Food Chain*. Policy Brief, Stockholm International Water Institute, 2-35.

http://www.siwi.org/documents/Resources/Policy_Briefs/PB_From_Filed_to_Fork_2008.pdf, 4

⁹⁸ Bloom, *American Wasteland*, 19-20

⁹⁹ Lundqvist, de Fraiture, and Molden. *Saving Water: From Field to Fork*, 11

¹⁰⁰ Lundqvist, de Fraiture, and Molden. *Saving Water: From Field to Fork*, 30

to the chemicals. Producing the additives requires energy. Made from nitrogen and natural gas, making fertilizer is 40% of all the energy used in the food chain.¹⁰¹

The land we use is also destroyed from farming. Chemical fertilizers and pesticides degrade the environment. Fertilizers weaken soil and lead to chemical runoff which affects water systems. Additionally, physically farming destroys the soil. Tilling, crop rotation and monoculture weakens the soil and strips it of nutrients. Additionally, the rate at which we produce food does not give the soil a chance to revive itself naturally. Thus we must continue to use fertilizer and water which continues the cycle of expensive farming inputs, environmental degradation and economic waste.¹⁰²

To quantify the monetary value of food loss, this EPA report outlines how much money is wasted by food category. The pie chart below is in billions of dollars. It can be seen that the most wasted food products are meat, poultry and fish. In 2010 food waste in this category accounted for \$48.5 billion and 30% of total food lost in the United States.¹⁰³ Although this thesis does not focus on livestock production, producing meat, fish and poultry is incredibly energy and resource intensive. Wasting this percentage of these products is also a tremendous waste of resources, as well as a source of negative environmental impacts. According to the Natural Resources Defense Council factsheet on the impact of food production, "Eat Green," producing a half pound of beef, pork and chicken contribute approximately 7.5, 2, and 1.5 pounds of carbon dioxide respectively.¹⁰⁴ Returning to the scope of this thesis, vegetable waste quantifies to \$30

¹⁰¹ Bloom, *American Wasteland*, 19-20

¹⁰² Bloom, *American Wasteland*, 19-20

¹⁰³ Buzby, Wells, and Hyman. "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States.", 16

¹⁰⁴ 2010. "Eat Green: Our Everyday Food Choices Affect Global Warming and the Environment." *Natural Resources Defence Council*. February. https://www.nrdc.org/globalWarming/files/eatgreenfs_feb2010.pdf.

billion or 18.6% of total food waste, while fruit quantifies to \$19.8 billion or 12.3% of total food waste. Taken as a whole, the United States wasted \$522 billion at the retail level and \$371 billion at the consumer level simply because we let food go to waste.¹⁰⁵

Estimated total value of food loss in the United States by food group, 2010

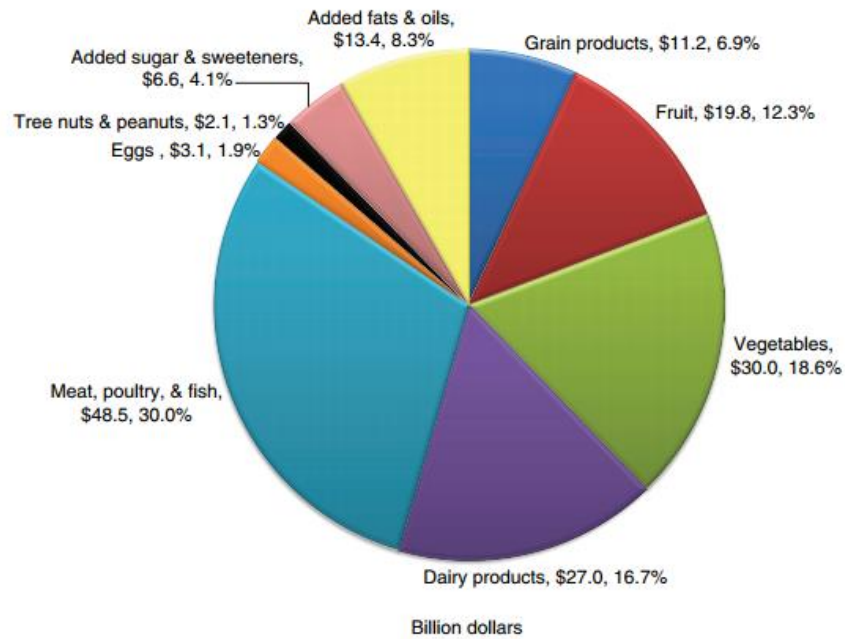


FIGURE 5

Landfills By sending food to landfills we are both wasting money and negatively impacting the environment. There is a common misconception that food biodegrades and returns nutrients to the earth when food is thrown out. This however concept however is incredibly false. Organic matter such as food, yard trimmings and paper can biodegrade, but in a landfill they are not in the proper environment to do so. Biodegradation occurs when organic materials are in compost conditions which means cutting it up, keeping it wet and exposing it to oxygen.¹⁰⁶ In a landfill,

¹⁰⁵ Buzby, Wells, and Hyman. "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States.", 16

¹⁰⁶ Rathje, William, and Cullen Murphy. 1992. *Rubbish: The Archaeology of Garbage*. Harper Collins Publishers., 117

food is kept with every other piece of garbage imaginable. Instead of breaking down, food is preserved.¹⁰⁷ When food does break down it breaks down slowly.¹⁰⁸

The EPA estimates that as of 2010, of the 250 million tons of MSW, 34 million tons or 14% is food waste. Only 3% of food waste was spared from ending up in landfills. These numbers are significant because of the expense of landfills and the harmful effects that landfills have on the environment. The cost of sending food waste to landfills equates to \$1.3 billion.¹⁰⁹

When food is combined with all other garbage, it rots and releases methane. Methane is a gas which traps heat more effectively than carbon dioxide, which means it is a contributor to global warming. The prevalence of landfills throughout the United States has landed landfills at the number two spot for human-related methane emissions. Moreover, food has the highest rate of methane yield. Bloom makes an excellent point in highlighting that although methane is only the ninth-largest contributor to greenhouse gases, the emission of methane could be mitigated if food waste was tackled more proactively. Bloom argues “it would be much easier to prevent...food from reaching the landfill than to keep vehicles off the road and out of sky.”¹¹⁰

Many United States landfills do not have the correct infrastructure to trap methane. The EPA requires landfills to have methane-collecting systems only if they are “large” landfills meaning they hold 2.5 million metric tons of garbage. The technology to collect methane is expensive which is why small to medium landfills do not incorporate them into their lots. In 2003 61% of landfill gases were released from landfills without the trapping system. However, even

¹⁰⁷ Rathje and Murphy, *Rubbish*, 112

¹⁰⁸ Rathje and Murphy, *Rubbish*, 115

¹⁰⁹ Buzby, Wells, and Hyman. "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States.", 2

¹¹⁰ Bloom, *American Wasteland*, 16

landfills with a gas-trapping system are not foolproof. According to Mortz Barlaz who was responsible for the EPA's Waste Reduction Model (WARM) estimates found that landfills with trapping systems would still let 38 to 45% of methane escape.¹¹¹ Moreover, estimates show that methane speeds up global warming 21 times more than carbon dioxide. Aside from methane, landfills also contribute to groundwater pollution if the landfills lack proper maintenance. Landfills create leachate which is a combination of liquid waste, organic degraded byproducts and rainwater. The seepage of leachate is a water pollutant.¹¹²

Methane also contributes to air pollution and have a strong smell which affects those who live near landfills. Much like the environmental injustices we will see in Chapter Four of this thesis, landfills are often located in low-income areas which is another decision made which hinders the livelihood of the people in this socio-economic class.¹¹³

Climate change The entire lifecycle of food contributes to climate change, thus wasting already-produced food exacerbates this problem. This is exemplified by the 2009 EPA report "Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices." According to the report, the provision of food accounts for 13% of all the greenhouse gas (GHG) emissions from the United States, as seen in the pie chart below. This percentage takes into account the entire lifecycle of food including production, processing, transportation and disposal. This report only quantifies emissions from food produced within the United States,

¹¹¹ Bloom, *American Wasteland*, 17

¹¹² Buzby, Wells, and Hyman. "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States.", 3

¹¹³ Bloom, *American Wasteland*, 18

but much of our food is imported. Thus if the report was to include all of the food consumed in the United States then the emissions percentage would be significantly larger.¹¹⁴

Systems-Based View of U.S. GHG Emissions (2006)

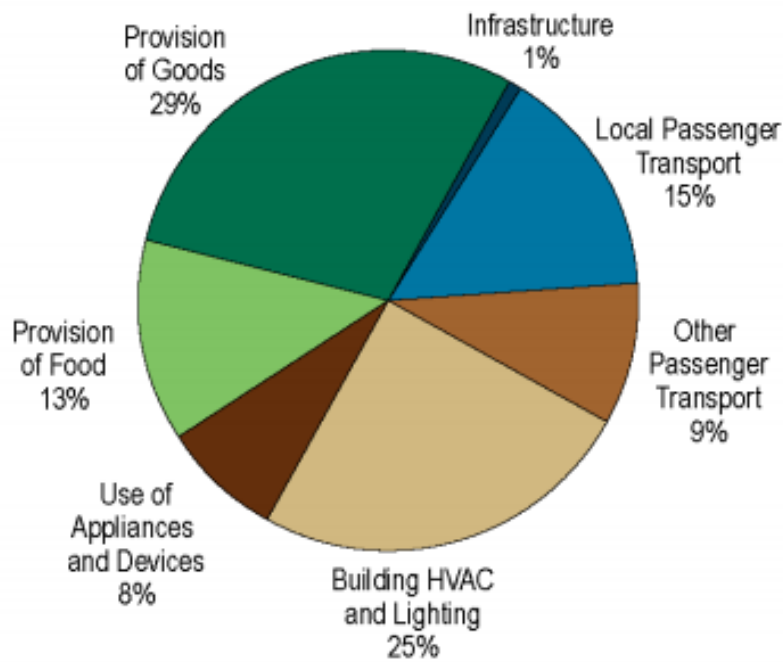


FIGURE 6

Although 13% may seem like a small contributor to GHG emissions compared to the other categories shown in the pie chart, this number is incredibly significant. Food production adds to the degradation of the planet, yet producers, retailers and consumers throw food away. Research by Kumar Venkat shows that food waste, which could be avoided, adds GHGs to the atmosphere at each stage of food production. The graph below quantifies how much GHGs are emitted from wasting various food items. The emissions are broken down by production, packaging, distribution/retail and disposal. This graph depicts that the resources involved in

¹¹⁴*Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*. U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response. http://www.epa.gov/oswer/docs/ghg_land_and_materials_management.pdf, 13

producing, packaging, and distributing the very same food which is wasted adds to the avoidable amounts of GHG emissions. By avoiding food waste, these emissions could be avoided.¹¹⁵

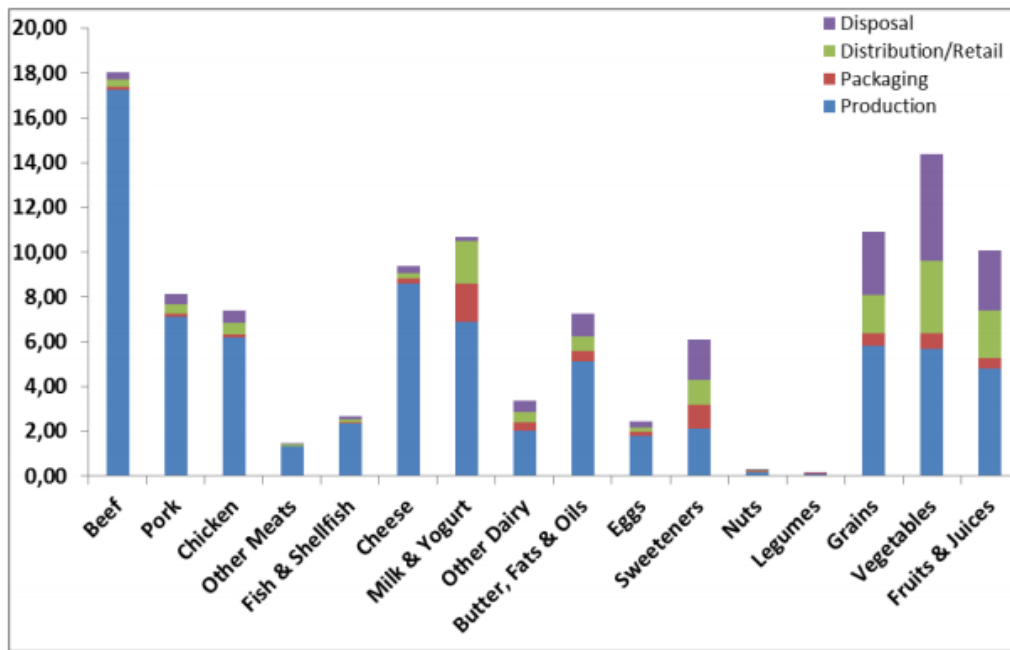


Figure 4. US national GHG emissions from avoidable food waste in 2009 (MMT CO₂e/year)

FIGURE 7

¹¹⁵ Venkat, Kumar. 2012. *The Climate Change and Economic Impacts of Food Waste in the United States*. International Journal on Food System Dynamics. <http://www.cleanmetrics.com/pages/ClimateChangeImpactofUSFoodWaste.pdf>, 440

Chapter Five:

Ethics of Food Waste

The statistics associated with hunger in the United States are alarming. How is that the most powerful and prosperous nation in the world has 49 million people who do not have enough food to eat? Of this number, 22% of children in the United States live in food insecure homes and as of 2009, half of all children in America will get their next meal from food stamps at some point in their childhoods.¹¹⁶ Hunger in the United States stems from issues of environmental justice and flaws in the food distribution system, both of which will be explored in this chapter.

Exploring Environmental Justice Why are people hungry in the land of the plenty? The answer to this question can be contemplated from many disciplines such as ethics or politics, but an underlying cause of hunger is the concept of environmental justice. As defined by the United States Environmental Protection Agency (EPA), environmental justice is

“the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.”¹¹⁷

¹¹⁶ Bloom, *American Wasteland*, 43

¹¹⁷ n.d. *What is Environmental Justice?* <http://www.epa.gov/environmentaljustice/>.

By defining environmental justice it is obvious that there is a recognition of the issue that some individuals are at a disadvantage in terms of their physical environment. This could mean that some individuals live near a landfill or in an area with a high rate of asthma from poor air quality. However, the concept of environmental justice comes from the fact that there are environmental injustices. There is a strong correlation between environmental injustice and civil rights issues. Low income and minority communities most commonly endure the effects from environmental problems such as hazardous waste sites, industry pollution, occupational hazards, and toxic chemical exposure.¹¹⁸ As these patterns have been drawn, the focus of environmental justice has shifted from conservation to the “maintenance of livable environments for people of color and low-income communities.”¹¹⁹ The search for environmental justice stems from three different areas of environmental injustice. The first is *environmental inequality*, which is the geographic pattern of environmentally dangerous entities, such as factories or hazardous waste sites, which are placed in low income communities of communities of color.¹²⁰ The second is *environmental racism* which is the “racial discrimination in environmental policy making and the unequal enforcement of environmental laws and regulations.”¹²¹ The third is *environmental discrimination* which is the concept that environmental burdens are placed in low income and minority communities based on the decisions of policy makers and corporations, and while in some cases it is unintentional in others it is deliberate.¹²²

¹¹⁸ Newton, David E. 1996. *Environmental Justice*. Santa Barbara: Contemporary World Issues., xiii

¹¹⁹ Newton, *Environmental Justice*., xiv

¹²⁰ Newton, *Environmental Justice*., 3

¹²¹ Newton, *Environmental Justice*., 4

¹²² Newton, *Environmental Justice*., 4

Exploring Food Justice Access to food falls into the realm of environmental justice. In their book *Food Justice*, Robert Gottlieb and Anupama Joshi attempt to define ‘food justice’ as it is not a solidly defined term. This book considers food justice to be an assurance that “the benefits and risks of where, what and how food is grown and produced, transported and distributed, and accessed and eaten are shared fairly.”¹²³ Unfortunately, the equal distribution of nutritious food is uncommon in the United States. Gottlieb and Joshi reference food access as a contributor to the issue of food injustice. In the 1990s ‘food deserts’ emerged in England. These deserts are areas without “affordable fresh food or full-service markets.”¹²⁴ A similar phenomenon is found in the United States which the authors describe as “grocery gaps.” These ‘gaps’ are areas which have few to none full-service, high quality and/or affordable grocery stores within walking distance of residential areas.¹²⁵ Prevalent in low-income communities in rural and urban areas, these grocery gaps are affecting cities such as New York City, New Orleans and Chicago, and the rural regions of Texas, Arkansas, Alabama and Oklahoma.

Returning to the concepts of environmental inequality and discrimination, the pattern of a lack of access to fresh, healthy and affordable food has been found in low income and minority areas. The evolution of this problem stems from the decisions made by the commercial food industry. As areas have urbanized and supermarket chains have grown over the years, the decision was made to move these stores to the growing suburban towns. This decision was made for a number of reasons. Space was a large contributing factor. As cars and highways gained popularity, stores needed space for parking lots as well as for trucks to bring in products.

¹²³ Gottlieb, Robert, and Anupama Joshi. 2010. *Food Justice*. Cambridge: MIT Press., 6

¹²⁴ Gottlieb and Anupama, *Food Justice*, 40

¹²⁵ Gottlieb and Anupama, *Food Justice*, 41

Additionally, these chains wanted their stores to be uniform in layout, organization and products, thus more space was needed. It is also less expensive to operate the stores in suburban areas as rent and insurance costs more in cities.¹²⁶ In the end, corporations simply chose to operate in a way which would have the highest profit return, and in this case the highest profit came from wealthier suburban areas.¹²⁷ According to a nationwide study done by University of Connecticut's Food Marketing Policy center, the "zip codes with the percentage of households on public assistance had less supermarket space per capital than higher-income zip codes."¹²⁸

Consequences of Food Injustice As healthy, affordable food options have fled from low income areas, a health crisis has emerged in the United States. According to the USDA Economic Research Service (ERS) approximately 14.5% of American households faced food insecurity at some point during 2012.¹²⁹ Based on the definition of food insecurity by the ERS, these homes faced the "household-level economic and social condition of limited or uncertain access to adequate food."¹³⁰ The operative word in this definition is adequate. Not all food will provide the sustenance for "an active, healthy life," which the ERS includes in the definition of food security.¹³¹ As supermarkets with hundreds and even thousands of food options leave low-income areas, the people in these neighborhoods are left with few options for food, let alone healthy food. With the lack of accessible grocery stores, fast-food chains and minimarts have

¹²⁶ Winne, Mark. 2008. *Closing the Food Gap*. Boston: Beacon Press., 88

¹²⁷ Winne, *Closing the Food Gap*, 87

¹²⁸ Winne, *Closing the Food Gap*, 88

¹²⁹ Coleman-Jensen, Alisha, Mark Nord, and Anita Singh. 2013. *Household Food Security*. Economic Research Report, United States Department of Agriculture. http://www.ers.usda.gov/publications/err-economic-research-report/err155.aspx#.U2QzA_IdWb9.

¹³⁰ n.d. *Definitions of Food Security*. http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx#.U2Q01_IdWb9.

¹³¹ n.d. *Food Security in the U.S.* <http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us.aspx#.U2Q1nPldWb9>.

taken over the landscape of these poor areas.¹³² As a result of the disparities in food access, there has been an increase in public health issues such as obesity, heart disease and diabetes.¹³³

The epidemic of obesity can appear to be a paradox in a nation where there is plenty of food, a hungry population, and a population which lets food go to waste. However, one third of adult Americans are obese as well as one third of children.¹³⁴ Unfortunately, obesity statistics are most represented by low-income individuals. For example, "low-income young children are more likely to be overweight than underweight by a ratio of seven to one."¹³⁵ What is even more alarming however, is that those who are obese are often hungry for nutrients. The inexpensive options consumed by people in low-income areas are often high in fat and low in nutrients and proteins. This is exacerbated by the ease of access to fast-food chains. Fast-food companies capitalize on low-income areas and have a tendency to open their establishments in low-income or minority neighborhoods.

When supermarkets are present in these areas the healthy options are often more expensive than in suburban markets. In 1983 the Hartford Food System and Citizen Research Education Network surveyed 44 stores found to assess food prices. Their research found that inner-city supermarkets were 14 to 37% more expensive than suburban stores. Essentially, the poor who are concentrated in these cities are spending more money on food than higher income families in suburban areas.¹³⁶

¹³² Winne, *Closing the Food Gap*, 111

¹³³ Winne, *Closing the Food Gap*, 111

¹³⁴ n.d. *Childhood Obesity Facts*. <http://www.cdc.gov/healthyyouth/obesity/facts.htm>. AND n.d. *Adult Obesity Facts*. <http://www.cdc.gov/obesity/data/adult.html>.

¹³⁵ Goldberg, Rebecca. 2013. "No Such Thing as a Free Lunch: Paternalism, Poverty, and Food Justice." *Stanford Law & Policy Review* 24 (1): 35-98., 44

¹³⁶ Winne, *Closing the Food Gap*, 89

There is a clear price difference in healthy foods and unhealthy foods, and unfortunately this division is caused by the agricultural policies discussed in Chapter Four. Not only do these policies create a surplus of food which leads to waste, much of these subsidized items are turned into unhealthy and inexpensive food. According to the documentary “A Place at the Table,” since 1995 the USDA has spent a quarter of a trillion dollars on farm subsidies. 84% of the subsidies go toward commodity crops such as cotton, wheat, corn, rice and soy, 15% goes towards dairy, livestock and other, while less than 1% goes to fruits and vegetables.¹³⁷ Between subsidizing the wrong foods and having an unequally distributed grocery store system, low-income communities are at a severe disadvantage.

Broader Explanation for Food Injustice While food distribution is flawed from retail politics, it is also flawed from our production practices and culture of waste. Food waste in itself is an environmental injustice. If we were to refocus wasted food to a better distribution system, wasted food could feed America’s hungry. According to a study conducted by Kevin Hall at the National Institute of Health, it is currently estimated that if we recover a quarter of the food we waste, it could be used to feed 43 million people three meals a day.¹³⁸

¹³⁷ 2012. *A Place at the Table*. Directed by Krisit Jacobson and Lori Silverbush.

¹³⁸ Bloom, *American Wasteland*, 70

Conclusion:

Want Not, Waste Not

While there are many problems associated with food waste including economic, environmental and social issues, there is one upside to this epidemic. Food waste is preventable. At every step of the food chain, waste can be averted. This final chapter will provide suggestions for producers, retailers and consumers to avoid food waste. Additionally, an example of a new type of grocery store will be highlighted as it combats both food waste and food injustices. Finally, the United Kingdom's relationship with food waste will be used as a case study and exemplary model for the United States.

In light of the food waste problem in the United States, the USDA and EPA have created two separate programs to combat this problem. Initiated in June 2013, the USDA US Food Waste Challenge brings "a fundamental shift in how we think about and manage food and food waste in this country." The program accomplishes this by asking food producers, distributors, retailers, as well as other interest groups to share their methods for food waste reduction, as well as by educating the public of productive waste-management practices. The EPA has a very similar program known as the Food Recovery Challenge. While both of these programs aim to reduce food waste and neither of these programs involve the consumer population, the Food Recovery Program differs from the Food Waste Challenge in that it asks participants to set a food-waste reduction goal and assists these participants to reach and measure their goals.¹³⁹ These programs are a vital first step to reduce food waste, and while both programs provide vital

¹³⁹ n.d. *Frequently Asked Questions*. <http://www.usda.gov/oce/foodwaste/faqs.htm>.

information, the Food Recovery Challenge created an accessible info-graphic (as seen below) which sets out a plan to reduce food waste. This pyramid is intended for participants of the Food Recovery Challenge, meaning businesses or organizations, but it is applicable to food producers, food retailers and consumers.

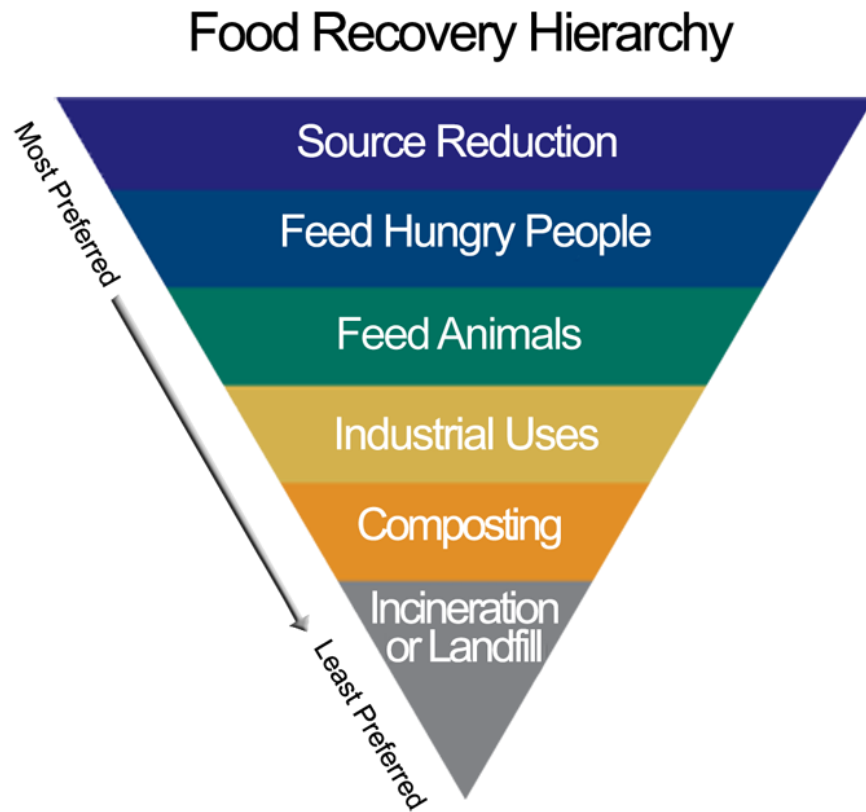


FIGURE 8

It is common for food producers to produce in excess, as seen in Chapter One and explained in Chapter Two, however it is unlikely that a solution to food waste on the production level will be a decrease in output. Uncertainties in the market and risks such as bad weather or disease during the growing season, government subsidies to produce food, and a number of other factors will make it difficult for large scale growers to produce less. However, these

producers can take steps to reduce their food from going to waste. Producers can identify ways to repurpose the products which are unfit for retail stores. As an example, baby carrots, a now-common snack, was invented because a farmer realized that 70% of the carrots he produced went to waste because they were not “perfect” by retail and consumer standards. He took the irregular carrots and cut them into “baby carrots.” Not only did he salvage perfectly good carrots from ending up in the dump, he profited off of the discovery as baby carrots sell for \$.50 a pound while whole carrots sell for \$.17 a pound.¹⁴⁰ Imperfect crops can go towards canning, freezing, and pickling just to name a few. To fulfill another pyramid suggestion, producers who are left with trimmings and peels should establish a system to divert these leftovers to animal feed.¹⁴¹ Referring back to the EPA’s pyramid, food producers can also reduce food waste and help those in need by donating excess food. The USDA has set up a system known as “Gleaning” which is “the act of collecting excess fresh foods from farms, gardens, farmers markets, or any other source.”¹⁴² By distributing excess to those in need, people who face food insecurity or live in food deserts will be lifted from their situation while also eliminating food waste. If large farms do not participate in gleaning, they can establish ties to a local food bank or similar institution.

A number of the levels on the EPA pyramid are applicable to food retailers. As identified in Chapter One, a large reason why food is wasted from grocery stores and restaurants is simply because they order too much food. These establishments can reduce food waste by ordering the amount of food, and the target amount can be identified by keeping track of inventory. By uncovering a pattern of what is popular and what is not, stores and restaurants can be stocked

¹⁴⁰ Gunders, *Wasted*, 8

¹⁴¹ Gunders, *Wasted*, 19

¹⁴² n.d. *Recovery/Donations*. <http://www.usda.gov/oce/foodwaste/resources/donations.htm>.

accordingly. In the age of advanced technology, forecasting software is available for large grocery stores and restaurants. This technology can track customer purchases and with enough data, stores and restaurants will be able to predict demand and order the correct amounts of food.¹⁴³ Although retailers might not be the biggest supporter of this notion, supermarkets could also reduce food waste by not restocking their hot food sections and buffets up until it closes. Chapter One highlights that supermarkets are concerned about customer perception, they want to have the freshest products at all times, but there is no need to restock trays of pre-made meals and pre-cut veggies half hour before the store closes. Instead, allow the trays to run out until the store closes.¹⁴⁴ Food retailers can also donate their food, which is suggested by the pyramid. In fact, there are a number of federal laws which incentives donations. The Bill Emerson Good Samaritan Food Donation Act allows for retailers to donate grocery and food products to nonprofits while not holding them liable if illnesses arise (provided there was no negligence on the part of the donor.) The Internal Revenue Code 170(e)(3) provides businesses with tax deductions if they donate nutritious food to those in need.¹⁴⁵ Grocery stores and restaurants can also divert food waste to compost. As a leader of many ambitious movements, New York City has also taken on the task of making composting accessible. As part of PlaNYC, Mayor Michael Bloomberg's green initiative for the city, there is a goal to divert 75% of solid waste from landfills by 2030. To achieve this goal, PlaNYC implemented a Food Waste Challenge in 2013. This challenge involves over a 100 NYC restaurants who committed to reduce food waste by 50%

¹⁴³ Bloom, *American Wasteland*, 247

¹⁴⁴ Gunders, *Wasted*, 19

¹⁴⁵ *Recovery/Donations*. n.d.

through composting and tracking their waste. This is an important program as one third of the 4 million tons of garbage sent to landfills in NYC each year is food waste.¹⁴⁶

Although consumers are not the target participants of many of these food waste programs, many steps of the EPA pyramid applies to the actions which individuals can take to reduce food waste. Consumers can abide by the most preferred step of the pyramid, source reduction. Consumers can stop wasting food by purchasing food more cautiously. Before heading to the store individuals should do an inventory of their refrigerators, pantries and freezers to cook what they already have on stock. If there are few options at home, plan out your meals for the week, make a shopping list and only buy the necessary ingredients in the right quantities. Buying food in bulk is also a big source of food waste, as the food spoils before it is put to use.¹⁴⁷ It is also important to be mindful of how you use food. Food can be saved by repurposing it. A few examples of thriftiness in the kitchen: cut up stale bread and toast it and use as croutons; start a vegetable trimmings bag and keep it in the freezer, once you have enough trimmings boil it in water for homemade and healthy vegetable stock for soup; If you see your fresh fruit is going to spoil, freeze it immediately and use later on for smoothies. If there is food cannot be salvaged consider the second to last step on the pyramid, composting. Cities throughout the country are implementing municipal compost systems. New York City has a pilot compost project known as the Organics Collection program. There will be curbside pickup of organic waste, which includes food scraps, food-soiled paper, and yard waste, throughout designated areas of the five boroughs. Some schools, agencies and non-profits are also included

¹⁴⁶ n.d. "Mayor's Food Waste Challenge to Restaurants."

http://www.nyc.gov/html/sbs/downloads/pdf/neighborhood_development/nddblog/FWC_overview.pdf.

¹⁴⁷ n.d. *Reducing Wasted Food Basics*. <http://www2.epa.gov/recycle/reducing-wasted-food-basics>.

in the pilot program.¹⁴⁸ Returning to the top of the EPA pyramid, individuals can also donate food. Nonperishable goods which are not going to use in the home are perfect candidates to be donated. By taking these steps, you will reduce the amount of food you purchase, you will save money and you will keep food out of landfills.

As discussed in Chapter Five, wasting food is an injustice not just for environmental and economic reasons, but also for social reasons. How is it that we are able to waste food for trivial reasons such as produce not being “perfect” enough or an item is close to its sell-by date, while millions of people in the United States go hungry or are malnourished? To make amends with this disgraceful paradox, across the country there are discount supermarkets which sell imperfect products at discounted prices. However, these stores are only combating food and environmental injustices if they are located in food insecure areas. The Daily Table, a discount supermarket and restaurant in Dorchester, Massachusetts, is an example of a discount store which fights food waste and environmental injustices. The Daily Table was founded by Trader Joe’s former president, Doug Rauch who believes that the food we waste can be salvaged. The Daily Table sells food which grocery stores do not because of issues with the sell-by dates. Imperfect produce will also be sold, and much of this food will be repackaged or prepared as meals. In addition to ending food waste, The Daily Table also combats environmental injustice and health issues associated with poor nutrition and food access/insecurity. Dorchester is a low-income city, thus the people in this area will have inexpensive, good quality and nutritious food

¹⁴⁸ n.d. *Organics Collection Pilot Areas & Schedules*.

http://www.nyc.gov/html/nycwasteless/html/compost/collections_ocp_pilotareas.shtml.

options. The restaurant meals will be sold at prices similar to fast-food chains which allows low-income individuals access to healthy options within their budget.

It is possible to reduce food waste in the United States, especially through federal encouragement. To win the fight against food waste, it is important to look at other countries who have reduced their own food waste. The United Kingdom has established a good anti-food waste model which the United States can learn from. The United Kingdom has its own not-for-profit company called Waste and Resource Action Programme (WRAP) which works with individuals, businesses and government agencies to reduce food waste.¹⁴⁹ They educate people about waste prevention, assist recycling efforts and gather data regarding food waste. While WRAP is not technically a government agency, much of its funding comes from the United Kingdom's Department of Environment, Food and Rural Affairs (DEFRA). This connection is beneficial however, as the government has a vested interest in reducing food waste.¹⁵⁰ WRAP's research showed that the main culprits of food waste in the United Kingdom came from unused food and preparing too much food. WRAP collaborated with local governments on a campaign called "Love Food Hate Waste" to spread awareness regarding food waste.¹⁵¹ Another example of the United Kingdom's government support of reducing food waste was seen in 2008 when Prime Minister Gordon Brown identified that supermarkets increased food waste because they created "unnecessary demand" for products through policies such as buy-one-get-one-free. This inspired British retailer to test out a new policy, buy-one-get-one-free-later. Customers would be able to purchase the item they needed that day and they would receive a credit to get the

¹⁴⁹ n.d. *What We Do*. <http://www.wrap.org.uk/content/what-we-do-0>.

¹⁵⁰ Bloom, *American Wasteland*, 267

¹⁵¹ Bloom, *American Wasteland*, 268

free item during another visit, thus not allowing good food to go to waste.¹⁵² While this policy is still in a test phase, it is a good step which can be implemented in the United States, and most importantly it was encouraged by the government.

The United Kingdom government encourages two other efforts to reduce food waste, and both of these can be utilized in the United States as it targets some of the main issues associated with food waste. First, the United Kingdom has a landfill tax which began in 1999. For every metric ton of garbage sent to the landfill, the disposer was taxed £3. In 2008 the tax increased to £8 per metric ton. The idea behind the tax is to discourage throwing away food as it could be diverted to other purposes, such as composting. The tax was effective, composting and anaerobic digestion rates increased and between 2005 and 2007 household waste decreased by 12%.¹⁵³ Second, the government identified that there needs to be a change in labeling food in terms of dates. United Kingdom consumers face the same problem as United States consumers in that they misunderstand the best-by, sell-by, use-by dates. According to WRAP 50% of United Kingdom consumers do not understand 'best-before' or 'use-by,' and 36% mix-up the meanings of those labels. A similar problem is seen in the United States and a lot of food is wasted because of confusing labels. To combat this issue, United Kingdom government agencies including DERFA and the Food Standards Agency worked with WRAP to educate consumers regarding the meaning of these labels and are also working towards clarifying the labels.¹⁵⁴

Conclusion The purpose of this thesis was to highlight the environmental problems associated with food waste in the United States. While food waste takes a toll on the

¹⁵² Bloom, *American Wasteland*, 268

¹⁵³ Bloom, *American Wasteland*, 265

¹⁵⁴ Bloom, *American Wasteland*, 286

environment in a number of forms, the progression of this thesis also proves that this environmental problem stems from a form of consumption which can be changed. Production practices can be altered, retailers can change their policies and more importantly, individuals can become more conscientious consumers. We live in a country where some can want all and then waste all, but returning to a culture of want not, waste not, both the environment and individuals will be better off.

Bibliography

- n.d. *Adult Obesity Facts*. <http://www.cdc.gov/obesity/data/adult.html>.
- n.d. *Agricultural Act of 2014: Highlights and Implications*. <http://www.ers.usda.gov/agricultural-act-of-2014-highlights-and-implications.aspx#.U2ZgvldWb9>.
- Ayres, Bill. 2014. "The 2014 Farm Bill: A Reflection After 40 Years of Advocacy." *The Huffington Post*. March 5. http://www.huffingtonpost.com/bill-ayres/the-2014-farm-bill-the-ba_b_4896404.html.
- Bellemare, Marc F, and Nicholas Carnes. 2013. *Why Do Members of Congress Support Agricultural Protection?* Duke University, 1-40. http://mpr.aub.uni-muenchen.de/47629/1/MPRA_paper_47629.pdf.
- Bentley, Amy. 1998. *Eating for Victory*. Urbana: University of Illinois Press.
- Bloom, Jonathan. 2010. *American Wasteland: How America Throws Away Nearly Half of Its Food (and What We Can Do About It)*. Da Capo Press.
- Buzby, Jean C, Hodan F Wells, and Jeffery Hyman. 2014. "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States." *Economic Information Bulletin*, United States Department of Agriculture, ii-33.
- n.d. *Childhood Obesity Facts*. <http://www.cdc.gov/healthyyouth/obesity/facts.htm>.
- Coleman-Jensen, Alisha, Mark Nord, and Anita Singh. 2013. *Household Food Security*. Economic Research Report, United States Department of Agriculture. http://www.ers.usda.gov/publications/err-economic-research-report/err155.aspx#.U2QzA_IdWb9.
- Cuellar, Amanda D, and Michael E Webber. 2010. "Wasted Food, Wasted Energy: The Embedded Energy in Food Waste in the United States." *Environmental Science and Technology* 6464-6469.
- n.d. *Definitions of Food Security*. http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx#.U2Q01_IdWb9.
- Dimitri, Carolyn, Anne Effland, and Neilson Conklin. 2005. *The 20th Century Transformation of U.S. Agriculture and Farm Policy*. Economic Information Bulletin, United States Department of Agriculture. <file:///C:/Users/user/Downloads/60b7d51e844f9326d0.pdf>.
- Duscha, Julius. 1964. *Taxpayers' Hayride*. Boston: Little, Brown and Company.
2010. "Eat Green: Our Everyday Food Choices Affect Global Warming and the Environment." *Natural Resources Defence Council*. February. https://www.nrdc.org/globalWarming/files/eatgreenfs_feb2010.pdf.
- Encyclopaedia Britannica Online*. n.d. "Agricultural Adjustment Administration (AAA)." <http://www.britannica.com/EBchecked/topic/9551/Agricultural-Adjustment-Administration-AAA>.
- Evans, David, Hugh Campbell, and Anne Murcott. 2012. "A Brief Pre-history of Food Waste and the Social Sciences." *The Sociological Review* 5-26.
- Fitzgerald, Deborah. 2003. *Every Farm a Factory*. New Haven: Yale University Press.
- n.d. *Food Security in the U.S*. <http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us.aspx#.U2Q1nPldWb9>.
- n.d. *Frequently Asked Questions*. <http://www.usda.gov/oce/foodwaste/faqs.htm>.
- Goldberg, Rebecca. 2013. "No Such Thing as a Free Lunch: Paternalism, Poverty, and Food Justice." *Stanford Law & Policy Review* 24 (1): 35-98.

- Gottlieb, Robert, and Anupama Joshi. 2010. *Food Justice*. Cambridge: MIT Press.
- Gunders, Dana. 2012. *Wasted: How America is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill*. Issue Paper, Natural Resources Defense Council, 4-26. <http://www.nrdc.org/food/files/wasted-food-ip.pdf>.
- Hampe, Edward C, and Merle Wittenberg. 1964. *The Lifeline of America: Development of the Food Industry*. New York: McGraw-Hill Book Company.
- Henderson, Jason, Brent Gloy, and Michael Boehlje. 2011. "Agriculture's Boom-Bust Cycles: Is This Time Different?" *Economic Review* 83-105.
2012. *A Place at the Table*. Directed by Krisit Jacobson and Lori Silverbush.
- Kantor, Linda Scott, Kathryn Lipton, Alden Manchester, and Victor Oliveira. 1997. "Estimating and Addressing." *Food Review* 2-12.
- Lundqvist, J, C de Fraiture, and D Molden. 2008. *Saving Water: From Field to Fork-Curbing Losses and Wastage in the Food Chain*. Policy Brief, Stockholm International Water Institute, 2-35. http://www.siwi.org/documents/Resources/Policy_Briefs/PB_From_Filed_to_Fork_2008.pdf.
- n.d. "Mayor's Food Waste Challenge to Restaurants." http://www.nyc.gov/html/sbs/downloads/pdf/neighborhood_development/nddblog/FWC_overview.pdf.
- Nestle, Marion, and Lisa R Young. 2003. "Expanding Portion Sizes in the US Marketplace: Implications for Nutrition Counseling." *Research and Professional Briefs* 103 (2): 231-234. <http://portionteller.com/pdf/portsize.pdf>.
- Newton, David E. 1996. *Environmental Justice*. Santa Barbara: Contemporary World Issues.
2009. *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*. U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response .
2009. *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*. U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response . http://www.epa.gov/oswer/docs/ghg_land_and_materials_management.pdf.
- n.d. *Organics Collection Pilot Areas & Schedules*. http://www.nyc.gov/html/nycwasteless/html/compost/collections_ocp_pilotareas.shtml.
- Rathje, William, and Cullen Murphy. 1992. *Rubbish: The Archaeology of Garbage*. Harper Collins Publishers.
- n.d. *Recovery/Donations*. <http://www.usda.gov/oce/foodwaste/resources/donations.htm>.
- n.d. *Reducing Food Waste for Businesses*. <http://www.epa.gov/foodrecovery/>.
- n.d. *Reducing Wasted Food Basics*. <http://www2.epa.gov/recycle/reducing-wasted-food-basics>.
- Sifferlin, Alexandra. 2013. "Food Expired? Don't Be So Quick to Toss It." *CNN*. September 13. <http://www.cnn.com/2013/09/19/health/sell-by-dates-waste-food/>.
- Stuart, Tristram. 2009. *Waste: Uncovering the Global Food Scandal*. New York: W.W. Norton & Company, Inc.
- Venkat, Kumar. 2012. *The Climate Change and Economic Impacts of Food Waste in the United States*. International Journal on Food System Dynamics. <http://www.cleanmetrics.com/pages/ClimateChangeImpactofUSFoodWaste.pdf>.
- Wallach, Jennifer Jensen. 2013. *How America Eats: A Social History of U.S. Food and Culture*. Lanham: Rowman & Littlefield Publishers Inc.

n.d. *What is Environmental Justice?* <http://www.epa.gov/environmentaljustice/>.

n.d. *What We Do.* <http://www.wrap.org.uk/content/what-we-do-0>.

Winne, Mark. 2008. *Closing the Food Gap*. Boston: Beacon Press.

2013. "Your Scraps Add Up." *nrdc.org*. March. http://www.nrdc.org/living/eatingwell/files/foodwaste_2pgr.pdf.

Appendix

Figure 1 Buzby, Jean C, Hodan F Wells, and Jeffery Hyman. 2014. "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States." *Economic Information Bulletin*, United States Department of Agriculture, ii-33., 8

Figure 2 Buzby, Jean C, Hodan F Wells, and Jeffery Hyman. 2014. "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States." *Economic Information Bulletin*, United States Department of Agriculture, ii-33., 12

Figure 3 n.d. *Agricultural Act of 2014: Highlights and Implications*. <http://www.ers.usda.gov/agricultural-act-of-2014-highlights-and-implications.aspx#.U2ZgvldWb9>.

Figure 4 Cuellar, Amanda D, and Michael E Webber. 2010. "Wasted Food, Wasted Energy: The Embedded Energy in Food Waste in the United States." *Environmental Science and Technology* 6464-6469.

Figure 5 Buzby, Jean C, Hodan F Wells, and Jeffery Hyman. 2014. "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States." *Economic Information Bulletin*, United States Department of Agriculture, ii-33.

Figure 6

2009. *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*. U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response . http://www.epa.gov/oswer/docs/ghg_land_and_materials_management.pdf.

Figure 7 Venkat, Kumar. 2012. *The Climate Change and Economic Impacts of Food Waste in the United States*. *International Journal on Food System Dynamics*. <http://www.cleanmetrics.com/pages/ClimateChangeImpactofUSFoodWaste.pdf>.

Figure 8 n.d. *Reducing Food Waste for Businesses*. <http://www.epa.gov/foodrecovery/>.