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# Food Apocalypse: The Future of the American Diet

Kylie Farrell

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*Food Apocalypse: The Future of the American Diet*

Kylie Farrell

## ABSTRACT

At first glance, it would not seem that Americans must worry about their country's current food system. After all, American grocery stores are equipped to accommodate consumers' needs year-round and at all hours: shelves remain fully-stocked. What is not exactly comprehensible at this moment, is that it is highly possible that the American food system is economically bound to fail in the near future. This paper aims to explore the possibility of eventual failure of the American food system. This potentially looming event could be catastrophic for the United States, thus, this paper coins it as the Food Apocalypse. In this context, the term *food apocalypse* can be defined as the reconstruction of the current American food system due to its structural failure. Specifically, this paper discusses what food consumption looks like currently for Americans, what it might look like as failure approaches and what American diets might look like post-food apocalypse. Chapter one explains the complexity of the American food system and how it currently operates. Chapter two discusses the history of the American food system, why this system is problematic and why failure is probable. In chapter three, this paper describes the economic implications of what a failing food system might look like to the American public: this includes poverty, shortages, rations and massive economic decline. The aftermath of a failed food system is explained in chapter four. It reveals what the diet of a typical American might look like post-food apocalypse from an environmentally sociological standpoint. Chapter five is concerned with policies that might construct a food system that is truly sustainable in America, so as to avoid another catastrophic event like the food apocalypse.

Keywords: food apocalypse, environmental economics, environmental sociology, environmental policy, consumption, American food system, post-industrial agriculture

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I would like to acknowledge my mother, Dr. Cathleen Cubelic, who has played a tremendous role in the editing of this paper. Although she is not as well-versed in environmental issues as she is in educational leadership, her willingness and unwavering support has inspired me to keep going. Thank you to my sister, Jessica, for your encouragement and for opening my eyes to the world of environmental activism. Your intelligence continues to amaze me. Thank you to Kevin, for listening to all of my ideas and reading my work so carefully. I am so grateful for your interest in this research.

I would like to thank my friends, Christina, Carolina and Gabriella, for their interest in this project, and helping me to make it as comprehensible as possible, so that we may reach people and encourage them to change their ways for the betterment of our environment. I would also like to express my appreciation to Professor Marc Conte who helped me extensively with the economics of this paper. Lastly, I would like to thank Dr. Matthew Eaton and my environmental studies colleagues for their intelligence and their ideas for a better environmental future for our country: you have inspired this project.

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*Introduction: What is the Food Apocalypse?*

I encourage you to think about the commonly used phrase in America, “Let’s go grab something to eat.” In America today, what does that mean to you? It might seem a bit silly to dissect such a trivial phrase, as I am sure you usually hear it or use it in passing and in casual, friendly settings. However, the reason I encourage us to dissect this phrase is precisely because of its casualness. The phrase implies that the task of “grabbing something to eat,” will be both *quick* and *easy*. The word *grab* in the phrase illustrates this picture of food literally being cooked, packaged, waiting to be bought, picked up and eaten by an American consumer. Currently for Americans, it is essentially that easy. Chances are you are perfectly able to picture yourself both using this phrase and carrying out the action of “grabbing some food” with a colleague or a friend at a nearby Chipotle for lunch. What is not so easy for us, though, is to think about going to a nearby Chipotle and the workers simply telling you, “sorry we have no food today.” To go into a grocery store and employees tell you, “sorry we ran out of everything and we aren’t sure when we’ll get a new shipment” is unimaginable to us, is it not? What I plan to achieve in this paper is to make that thought imaginable to us based on the current structure of the American food system. Its aftermath is a phrase I will refer to as the *food apocalypse*. By understanding the term food apocalypse, we will be able to understand that it is a catastrophic event that will be imminent in the future of American agriculture if we continue producing and consuming food in the same way that we are now.

A food apocalypse is imminent if our food system is not fixed because, each day in the United States, we are slowly committing ecocide. Ecocide (ecological suicide) is the unintended consequence of a civilization that depletes the resources it desperately relies on. In his book,

*Collapse: How Societies Choose to Fail or Succeed*, Jared Diamond asserts that most societal collapses are at least partly caused by ecocide. Diamond breaks down the processes that result in ecocide into eight different categories: deforestation and habitat destruction, soil problems (erosion, salinization, and soil fertility losses,), water management problems, overhunting, overfishing, effects of introduced species on native species, human population growth, and increased per capita impact of people. Despite the years of success that the United States' industrialized food system has had feeding massive amounts of people inexpensively and on a small amount of land, it has certainly brought consequences, as well. Those consequences are all eight of the processes proposed by Diamond that will eventually result in ecocide. Even though the United States is historically thought of as a capitalistic and industrialized powerhouse, Diamond urges us to remember that, "...even the richest, technologically most advanced societies today face growing environmental and economic problems that should not be underestimated."<sup>1</sup> This paper aims to expose those growing environmental and economic problems in the American food system.

Please note that I fully understand the deep complexity of the food system in the United States. The aim of this paper is to expose our food system based on environmental, historical, economic and sociological components—holding all else equal. I came up with the term food apocalypse in an effort to metaphorically bring to light the issues surrounding the industrialized food system. I envision this research project to be a fresh and encouraging way for people to learn about the food system and its detriment. I feel as though I have put this issue into layman's terms so that the average consumer can understand the impact of the food system in a sort of

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<sup>1</sup> Diamond, Jared M. *Collapse: how societies choose to fail or succeed*. (London: Penguin Books, 2011), 2.

cinematic way that will hopefully be just as effective as, if not more than, another style of writing.

The impact of industrialized farming has been dramatic, both economically and environmentally. The increase mechanized nature of large scale, specialized farms has created consolidation that has transformed farming. Small, family run farms have been replaced almost exclusively by large corporations whose practices threaten the environment. Growing public awareness of the problems and threats posed by industrialized agriculture are increasing the demand for reform. Raising the level of education and equipping the public with the tools and resources needed to make better food choices are high priorities. The future of agriculture is explicitly tied to both economic and cultural considerations. The growth of industrial agriculture was heavily based on dollars and cents. Mass production at low cost was the primary goal and ultimate weakness of this approach. In achieving this goal, it was necessary to establish a philosophy of sameness, of both people and resources. This approach, in large part, removed the uniqueness and specialized nature of food.

Luckily, this is beginning a sort of paradigm shift, and creating an increased opportunity for niche farming. The economic value of food is based on what people are willing to pay. In most cases, people will pay for the foods that they really want. As a result, an opening exists for farmers who can meet the needs and wants of this niche market. Systematically shifting the mindset from asking the consumer to conform, to responding to the consumer's desires is a fundamental difference. This untapped potential will enable farmers to work with nature and what it provides, rather than to try to alter its natural resources. This practice will reduce the ecological problems that have arisen from industrialization.

## *Chapter 1: How the American Food System Works*

For the purpose of the evolution of this paper, I intend to keep the explanation of the extremely extensive and complex American food system as succinct as possible. This chapter is for the reader to get an idea of the workings of the American food system without receiving an entire historical recitation of American agriculture. That said, I will focus mainly on the food supply chain used in the United States as a model of production and consumption.

In order to understand why a change in the American food system is crucial to the future of food, it is essential to understand how this system actually works in our country. The American food system is a broad network that comprises a great deal of transactions in between the production and consumption phases: harvesting, processing, distributing and marketing.<sup>2</sup> The movement of actual goods in our food system is a simple and sequential process, that is altered and complicated by a variety of actors, both human and institutional. These actors include ranchers and farmers, workers and consumers; institutional actors like governments, corporations and organizations; and living organisms like bacteria and insects.<sup>3</sup> Actors such as these have significant impact on the modern food system because their behavior is contingent upon changes occurring in their environments. When actors respond and adapt to these changes, there is a direct effect on our food system. Consider the behavior of consumers for example: if the World

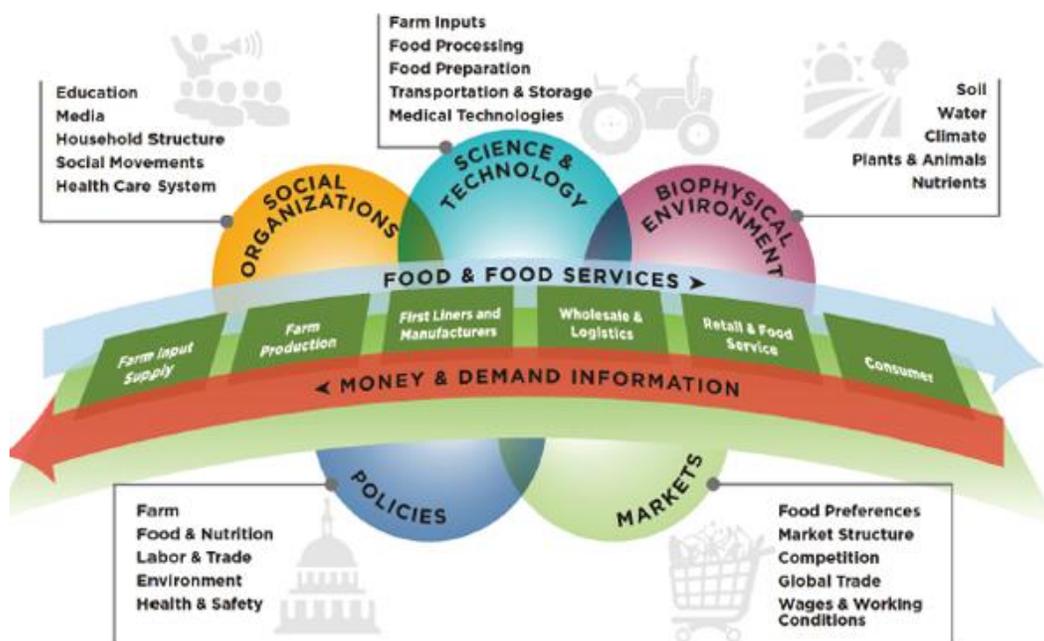
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<sup>2</sup> Wallinga, David. "Today's Food System: How Healthy Is It?" *Journal of Hunger & Environmental Nutrition* 4.3-4 (2009): 251–281.

<sup>3</sup> IOM (Institute of Medicine) and NRC (National Research Council). *A Framework for Assessing Effects of the Food System*. (Washington (DC): The National Academies Press (US), 2015), 6: Box S-2.

Health Organization was to publish an article stating that eating potatoes grown in Idaho could cause cancer, the market demand for potatoes in the American food system would experience a massive shift. When attempting to understand the food system, it is important to remember that there is a complex and inseparable linkage between our food and actors. The friction that is caused by these two factors is what stimulates our food system. Figure 1 below provides a visual aid of that stimulation.

*Figure 1: Links between the food supply chain and the larger social/institutional context<sup>4</sup>*



Over the past fifty years the American food system has seen drastic changes in its operation. In time, “[Our] nation’s food system has seen remarkable success in providing the U.S. population with a varied, relatively inexpensive, and widely available supply of food...The food system also represents one of the most significant components of the U.S. economy.”<sup>5</sup> In the United States, food production is virtually dominated by industrialized agriculture. Our food

<sup>4</sup> Ibid, 41.

<sup>5</sup> Ibid, 1.

system has perfected itself into an industrialized high-yield, high-profit, low-cost system that has been beneficial not only in the United States, but in a global context as well. Industrialized agriculture is unlike antiquated forms of agriculture. It is hugely successful in yielding such high levels of productivity because it uses "...heavy equipment and large amounts of financial capital, fossil fuels, water, commercial inorganic fertilizers, and pesticides to produce single crops..."<sup>6</sup> The consistent goal of industrialized agriculture is to exponentially increase each crop's yield. Below is the food supply chain in which industrialized agriculture operates in the United States.

The food supply chain starts in the production sector with farmers, fishers and ranchers who use their natural resources (land/water) and capital resources (machinery/tools/equipment) to produce raw, agricultural commodities such as crops and livestock.<sup>7</sup> Once a farmer's commodity is produced, one might naturally think that the next step is for the farmer's commodity to be packaged and placed on display for the consumer—perhaps in a nearby store; however, the American food system is much more complex than that. It requires that a number of processors be involved in between the farmer's initial production and the final act of consumption. Due to high demand, most American farmers now produce their commodities in such massive quantities, that they need to sell them to a handler who can assemble and store their commodities for them. A handler is basically a company that washes, waxes and wraps food like fruits and vegetables, for instance. The handler then ships the processed commodities to the manufacturer who transforms these raw commodities into packaged, processed food.<sup>8</sup> An example of a type of manufacturer is a meat-packing company. The packaged, processed food is

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<sup>6</sup> Miller, G. Tyler, and Scott Spoolman. *Living in the environment: principles, connections, and solutions*. (Stamford, CT: Cengage Learning, 2014), 281.

<sup>7</sup> IOM and NRC, *A Framework for Assessing Effects of the Food System*, 32.

<sup>8</sup> *Ibid*, 33.

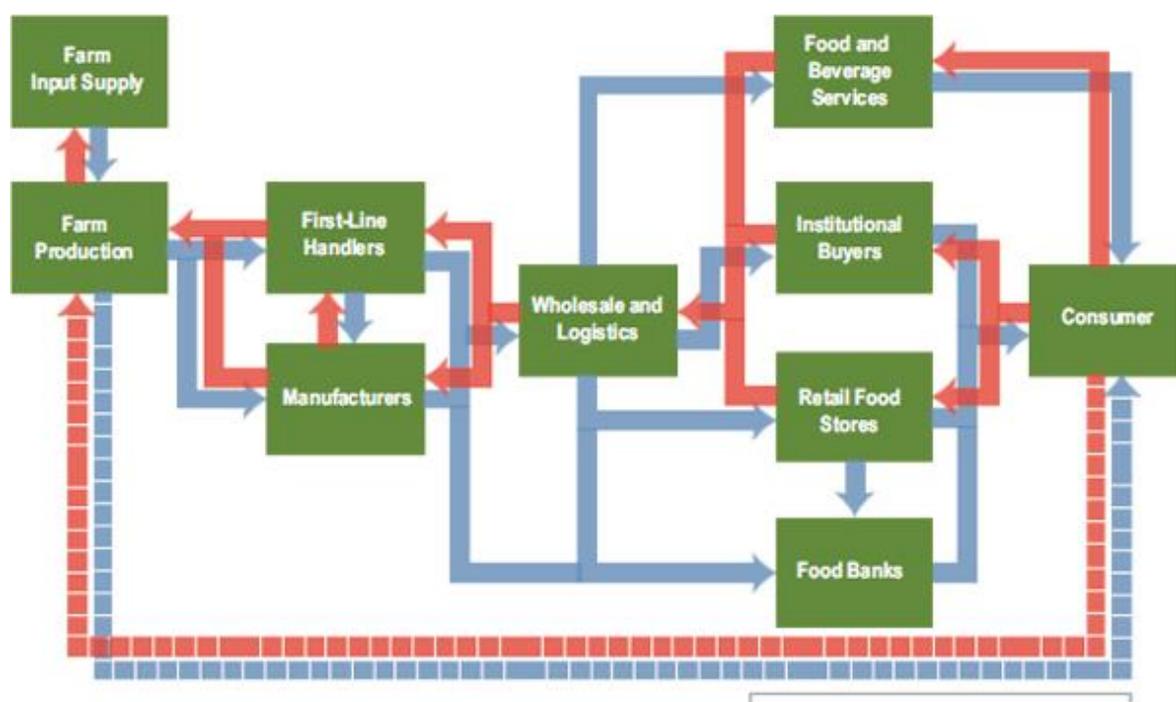
purchased by a wholesaler. Wholesalers buy food and store it in warehouses until they can sell it to retail stores. Once a retail store purchases the stored food from the wholesaler, the wholesaler will transport the food to the retail store using a travel system that can cover miles of distance.<sup>9</sup> It is finally at the retail food sector phase that most American consumers purchase their food. This sector encompasses any retail conduit where consumers can purchase food for preparation—grocery stores, gas stations, delicatessens, vending machines, etc. This food is also distributed in the food service sector to establishments like restaurants, fast-food restaurants, cafeterias, etc.<sup>10</sup> Although this constitutes only as an abbreviated explanation of the food supply chain in the United States, it offers a general understanding of how extensive the processes are that our food undergoes before it is put on shelves for us to consume. This food supply chain is the recipe of success for the modern, industrialized American food system. Figure 2 represents the food supply chain in a conceptual format.

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<sup>9</sup> Ibid, 33.

<sup>10</sup> Ibid, 34.

Figure 2: Conceptual model of the food supply chain<sup>11</sup>



The reason this shift toward industrialization is important to understand is because we want to know why and how industrialization, especially with respect to agriculture, came to fruition. In this chapter you will see that industrialization came to us at a time when we needed it and had the potential to be extremely beneficial to us. Over the course of this research project, I have been studying a great deal of Professor John Ikerd's work. Ikerd is an agricultural economics professor at the University of Missouri. One of his papers entitled, *Sustainable Agriculture: A Positive Alternative to Industrial Agriculture*, discusses America's gradual need for industrialized agriculture as a paradigm shift. Ikerd explains that in early twentieth century America, there was no reason for the industrial revolution not to infiltrate agriculture. There was too much to potentially gain from the industrialization of agriculture. The problem, prior to the

<sup>11</sup> Ibid, 33.

industrialization of agriculture, was that more than half of the American population “...were either farmers or lived in rural communities and it took about half of our total resources – money, time, and effort, just to feed and clothe ourselves.” The reason this paradigm shift was so important, was because we, as a nation, wanted to start making agriculture more efficient. America’s mission toward a more efficient food system was twofold: First, we needed a smaller number of farmers. We needed to increase the number of people hired in factories and business that were part of the emerging industrial economy. Second, we needed to decrease the amount that people were spending on food and clothing to leave enough of their income to be spent on what was being produce by these other new industries. In short, “...we had to make it possible for fewer farmers to feed more people better at a lower cost.”<sup>12</sup> According to Ikerd, accomplishing those two things is the reason we achieved the most efficient agriculture in the world and, consequently, the most robust economy in the world. Ikerd explains that:

Through specialization, simplification, and routinization we bent nature to serve our needs. We gradually harnessed the vagaries of nature and transformed farms into factories without roofs. Fields and feed lots became biological assembly lines with inputs coming in one side and commodities coming out the other. We achieved the economies of large-scale, specialized production as we applied the principles, strategies, and technologies of industrialization to farming.<sup>13</sup>

Now that you have an understanding of roughly how the food supply chain operates and why the industrialization of agriculture is an important topic in the United States, it is crucial that we take into consideration the implications that it can have—not only human beings—but also on

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<sup>12</sup> Ikerd, John. “Sustainable Agriculture: A Positive Alternative to Industrial Agriculture.” *University of Missouri*. [web.missouri.edu/ikerd/papers/Ks-hrtld.htm](http://web.missouri.edu/ikerd/papers/Ks-hrtld.htm).

<sup>13</sup> *Ibid.*

the environment surrounding us. The framework of the United Nation's Millennium Ecosystem Assessment asserts that humans play a crucial role in keeping ecosystems balanced. When humans' well-being is compromised, there can be serious and significant changes in ecosystems (and vice versa). We rely heavily on our ecosystems, just as they rely on us. This interdependence is critical to keep in balance if we are to maintain the system that we currently enjoy. However, human well-being can be altered by sources unaffiliated with ecosystems. This includes outside factors that are social, economic and cultural.<sup>14</sup> The reason this is relevant to this paper is because I am attempting to demonstrate the severe impacts that the American food system is having on human well-being. The Millennium Ecosystem Assessment maintains that there are five constituents of human well-being: basic materials for a good life; health; good social relations; security; and freedom of choice and action. Our food system is currently depriving us of these things, which means that our well-being is affected; thus, we are causing a change in ecosystems.<sup>15</sup> Page six of the assessment reads:

Actions to increase one ecosystem service often cause the degradation of other services...For example, because actions to increase food production typically involve increased use of water and fertilizers or expansion of the area of cultivated land, these same actions often degrade other ecosystem services, including reducing the availability of water for other uses, degrading water quality, reducing biodiversity, and decreasing forest cover...Similarly, the conversion of forest to agriculture can significantly change the frequency and magnitude of floods, although the nature of this impact depends on the characteristics of the local

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<sup>14</sup> Millennium Ecosystem Assessment. *Ecosystems and Human Well-being: Synthesis*. (Washington, DC: Island Press, 2005), v.

<sup>15</sup> *Ibid*, vi-vii.

ecosystem and the type of land cover change. The degradation of ecosystem services often causes significant harm to human well-being.<sup>16</sup>

Moreover, the assessment offers a statistic claiming that, although we have seen a tremendous amount of growth in per capita food production, it is estimated that in the year 2000-2002, 852 million people were still undernourished worldwide.<sup>17</sup> Although it seems that we are producing more (and degrading more land), people continue not to possess the five constituents of human well-being discussed above. My hope is that this paper will inspire us to eradicate that trend.

*Chapter 2: Why is the American Food System Problematic? (history discipline)*

The format of this chapter is twofold: (1) to provide a historical and developmental account of the food system in the United States and (2) to explain why our current food system is problematic. This will enable the reader to understand that the course of history has led us to the current American food system and why continuation along this path would be detrimental.

What we want to focus on when talking about the history of the food system in America are the major drivers of change. The book entitled, *A Framework for Assessing Effects of the Food System*, defines the five major drivers of change as: (1) environmental change, (2) markets, (3) policies, (4) technology and (5) social organizations.<sup>18</sup> The way in which our food system has come to operate is based on these five major drivers, which is evident in its history. Let us begin by examining how the five major drivers of change unfold naturally through the course of American agricultural history. Early Americans settled in various places across the new land—

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<sup>16</sup> Ibid, 6.

<sup>17</sup> Ibid, 61.

<sup>18</sup> IOM and NRC, *A Framework for Assessing Effects of the Food System*, 50.

which was rich in fertile soil and agreeable climates. Soon, diverse and climate-specific farming systems began to develop around our bountiful country. The Midwest consisted of northern Europeans who cultivated mixed crop–livestock systems; the southeast plantation culture was producing cash crops of cotton and tobacco; Spanish settlers in California built extensive irrigation systems.<sup>19</sup> It is hard to believe now, but during this early colonial period, there was such an abundance of land and not nearly enough farmers to cultivate it. In response to this shortage, the government even began to give away farmland to people who vowed to use it effectively. This era, known as the “American frontier,” ended around the latter part of the nineteenth century, when America’s focus shifted to urbanism.<sup>20</sup> The reason this was, and remains, a problem is because the advancements of early twentieth-century urbanism essentially swallowed the prime farmlands. Consequently, marginal farms were now not only responsible for producing food on less satisfactory land, but also were responsible for significantly increasing their yields. This was a struggle until the technological advancements of fertilizer, genetic modification and pesticides were implemented in the mid-twentieth century.<sup>21</sup> However, this too was not without consequence. Soil erosion from carelessness and overuse, caused the Dust Bowl in the 1930s and sparked many concerns about the preventative agricultural methods that were taken to minimize risk. Biodiversity in species was decreasing, pesticides had major health effects, as well as air and water pollution, groundwater was being over-pumped and non-point source pollution was becoming visible as water moved over the land. Some Americans became angry and demanded environmental change and protection for the food system. As a result of these concerns, in the 1970s, agencies and regulations like the Environmental Protection

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<sup>19</sup> Ibid,50.

<sup>20</sup> Ibid, 46: Figure 2-10.

<sup>21</sup> Ibid, 51.

Agency (EPA) and the Clean Water Act were developed. In the current American food system, our experiences are similar but even more specific. For example, in 2017, consumer demand drove environmental change with the organic food market and a push for ethical treatment of animals. In this brief recitation of the history of the American the drivers that push for change in the economy are apparent.

A remarkable sector of American agricultural history is traditional farming, which has been a stable, long-standing source of abundance and growth in our country. In the mid-nineteenth century roughly half of America's population were farmers, but today less than one percent of Americans farm as a primary source of income.<sup>22</sup> As a result of this reduction, those who do farm as a primary source of income must now do so on a much larger scale. However, this industry is now being driven-out and replaced by specialization farming and the concentration on agribusiness. An industry that thrives because of this market change in particular, is the beef industry. "The top four beef processing companies increased their share of the slaughter market from 36 to 79 percent between 1980 and 2005..."<sup>23</sup> It has become increasingly difficult for any alternative food system to compete against the industries that thrive in an intricate supply chain in the way that the beef industry and others like it do. In these industries, internal competition drives prices down and incentivizes efficiency.<sup>24</sup> As a result, these large companies increase their profit and food is even cheaper. Thus, a new market for farming in America takes precedence. This kind of market differs greatly from the American food system of the past, however. Jon Ikerd, explains that historically, retail food prices were based on consumer income. Ikerd writes, "Higher retail prices would ration available supplies

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<sup>22</sup> Ibid, 53.

<sup>23</sup> Ibid, 53.

<sup>24</sup> Ibid, 55.

and provide profit incentives for retailers, who then provided profit incentives for producers to supply more of the higher priced product. A drop in consumer demand reversed this process...The benefits of greater economic efficiency accrued to consumers, not producers.”<sup>25</sup> The producers who currently benefit the most, are rarely the farmer.

In Gary Holthaus’ book, entitled, *From the Farm to the Table: What All Americans Need to Know About Agriculture*, farmer Bill McMillan explains the hardships of being a farmer in the modern American food system. He says, “My system is probably not sustainable unless we can do something about receiving a fair price for our product. That’s part of it too. If we have to keep increasing the number of cows all the time—a 10 or 15 percent increase per year just to maintain...[our] standard of living—that’s not sustainable either.”<sup>26</sup> As large companies have started to monopolize the food and agriculture system, we are starting to see an increase in economic inequity with regard to the concentration of wealth among corporate agribusiness.<sup>27</sup> This is unsettling to me and my hope is that it is also unsettling to the reader. Therefore, I encourage us to start asking ourselves why we should be concerned with the direction in which our food system is going. In the coming chapters, you will observe these issues and hopefully understand that they are detrimental to the future of America.

An essay by the ecologist and author, Sandra Steingraber, entitled *Three Bets*, discusses Steingraber’s take on the simultaneous destruction of our economy and our ecology. In short, she attributes their destruction mostly to industrialization. For instance, chemically intensive agriculture near environments in which people live. In addition to the other harmful

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<sup>25</sup> Ikerd, John. “For Those Who Eat Food: Your Perishable Future.” *University of Missouri*. [web.missouri.edu/ikerdj/papers/DecorahLutherPerishableFuture.pdf](http://web.missouri.edu/ikerdj/papers/DecorahLutherPerishableFuture.pdf).

<sup>26</sup> Holthaus, Gary H. *From the farm to the table: what all Americans need to know about agriculture*. (Lexington, KY: University Press of Kentucky, 2009), 110.

<sup>27</sup> Ikerd, “For Those Who Eat Food: Your Perishable Future”, 3.

environmental effects caused by industrialized agriculture, Steingraber has also found demonstrative links between traces of farm and industrial chemicals in drinking-water wells to bladder cancer. The problem with alarming environmental issues like this one is that they are often not exciting to talk about or found in American mainstream media.

With issues such as environmental and agricultural shortcomings, we tend to subdue their importance because it is not something that we need to be immediately afraid of: meaning that we still have food on our tables and in our grocery stores. We still have water coming from our faucets and in our prepackaged bottles. What we fail to do is see the signs and the imminent threats and act before we have already failed. Steingraber writes, “Our economy and our ecology are both complex, globalized systems whose interconnections are little understood until something goes wrong.”<sup>28</sup> I am fearful that this is what will happen with agriculture. We will wait until a catastrophic event like the food apocalypse to change the way agriculture is carried out in America.

As we discussed in chapter one, the industrialization of agriculture was very important to the development of American economic production. Americans ought to take pride in the successes of industrialized agriculture when it was necessary. But that is the key phrase here: *when it was necessary*. The problem with industrialized agriculture in the United States is not the fact that it was created. The problem is that we no longer need it in order for our nation to be successful both economically and environmentally, yet we continue to use it. Moreover, we are no longer reaping the benefits of it, so much as we are dealing with the harsh effects of its continuation. For example, Americans spend approximately ten cents per dollar of

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<sup>28</sup> Steingraber, Sandra. “Three Bets.” *Illinois Wesleyan University Magazine*: Vol. 19: Iss. 4, Article 3 (2010), 3.

their income on food produced by farms, yet only one cent of that dollar goes to the farmer while the remaining nine cents go to the marketing and advertising agencies. Simply put, we pay more to the packager of the product than we do the person who actually grows the product.<sup>29</sup> This is alarming for a number of reasons: our money spent is not benefitting the integrity of our food; it is certainly not benefitting the farmer; the quality of our food is being compromised; farmers are forced to produce more only to make less money; nearly all of the money we spend on an item is going toward the packaging of it that we throw away.

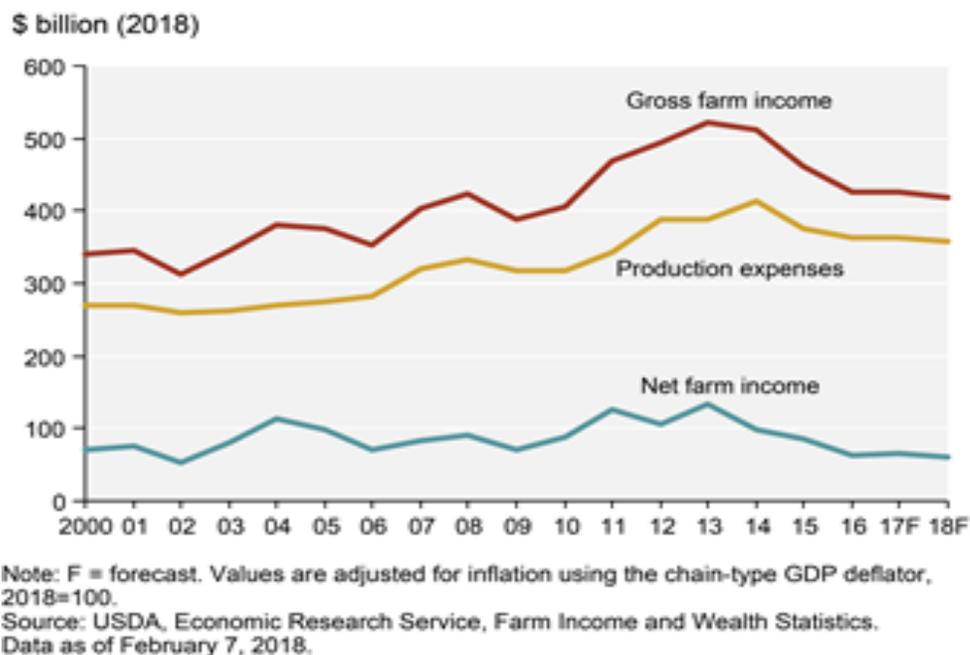
Ikerd estimates that less than two percent of the American population remain farmers. Food will not be made cheaper as more farmers go out of business because “[f]uture gains from further industrialization of agriculture must be squeezed from the farmer’s penny.”<sup>30</sup> As you can see, the more benefits we try to reap from industrialized agriculture the more detrimental it becomes to the future of the food system in America. In figure 3, the decline in net farm income is continually decreasing according to the United States Department of Agriculture.

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<sup>29</sup> Ikerd, “Sustainable Agriculture: A Positive Alternative to Industrial Agriculture.”

<sup>30</sup> Ibid.

Figure 3: Gross farm income, production expenses, and net farm income, inflation adjusted, 200-18F<sup>31</sup>

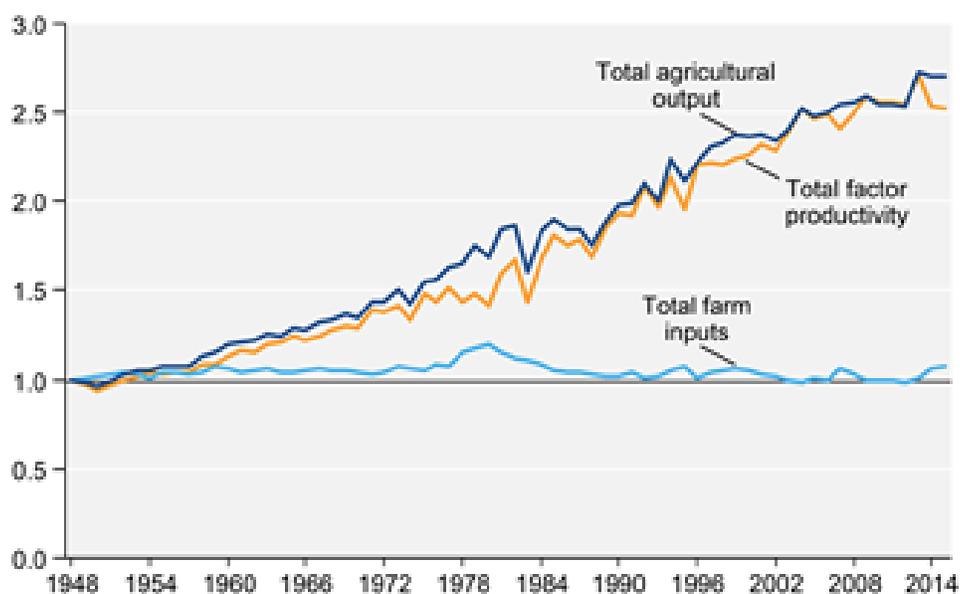


When thinking about the common threats of industrialized agriculture there are a couple of obvious ones that come to mind, such as the depletion of our natural resources like fossil fuels, animal habitat degradation and animal ethics, pesticides and fertilizers, the degradation of our physical environment, which then leads to a lower quality of life for society—namely, farmers, families and communities. What one might not immediately realize, that is equally as problematic as the environmental issues listed above, is the deterioration of rural communities with respect to agriculture. Much of Professor Ikerd’s research in *Sustainable Agriculture: A Positive Alternative to Industrial Agriculture* is based on the dwindling numbers of rural farming

<sup>31</sup> “Farming and Farm Income.” *USDA ERS - Sharing the Economic Burden: Who Pays for WIC’s Infant Formula*. (February 7, 2018). Accessed May 13, 2018. <https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/farming-and-farm-income/>.

communities whose local schools, small businesses, churches and public institutions all suffer as a result of farms growing larger and more specialized. This ultimately means there will be less farms and thus, less farm families in rural communities. Ikerd writes, “The social costs of industrialization continue to grow as rural communities wither and die...it takes productive people, not just production, to sustain local communities.”<sup>32</sup> The continuation of industrialized agriculture has serious consequences that will sooner than later start to infringe on all American communities. As you can see in figure 4, farm inputs are alarmingly low for how much success the agriculture industry seems to be having. This success is not benefitting farmers, their families or their communities.

Figure 4: U.S. agricultural output, inputs, and total factor productivity<sup>33</sup>



Source: USDA, Economic Research Service, *Agricultural Productivity in the U.S.* data series, as of October 2017.

<sup>32</sup> Ibid.

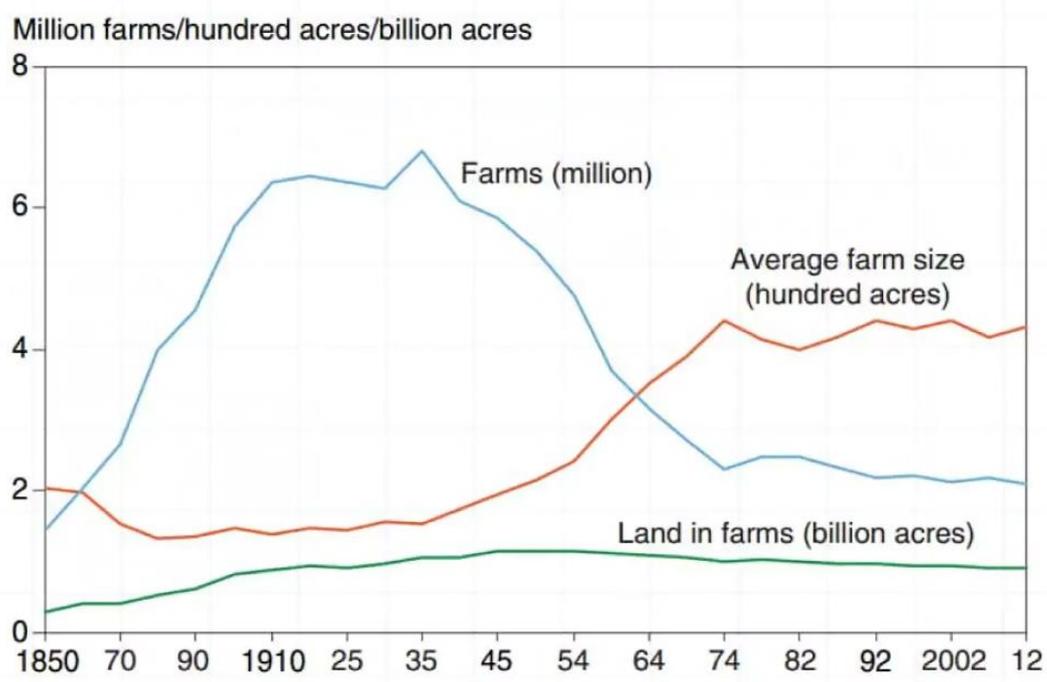
<sup>33</sup> Ibid.

The following charts are from an article in the Washington Post entitled, *The Decline of the Small American Family in One Chart*. As you can see, figure 5 explains that the number of farms in the United States have decreased by over seven million since the beginning of the twentieth century. The average farm size has increased by over two hundred acres, while the amount of land actually being farmed has remained almost constant. The article is based on the United States Department of Agriculture's *Agriculture and Food Statistics Report*. According to the report, "The top 10 percent of farms in terms of size account for more than 70 percent of cropland in the United States; the top 2.2 percent alone takes up more than a third."<sup>34</sup> Figure 6 accurately represents that based on data taken from the USDA's 2011 Agricultural Resource Management Survey.

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<sup>34</sup> Ibid.

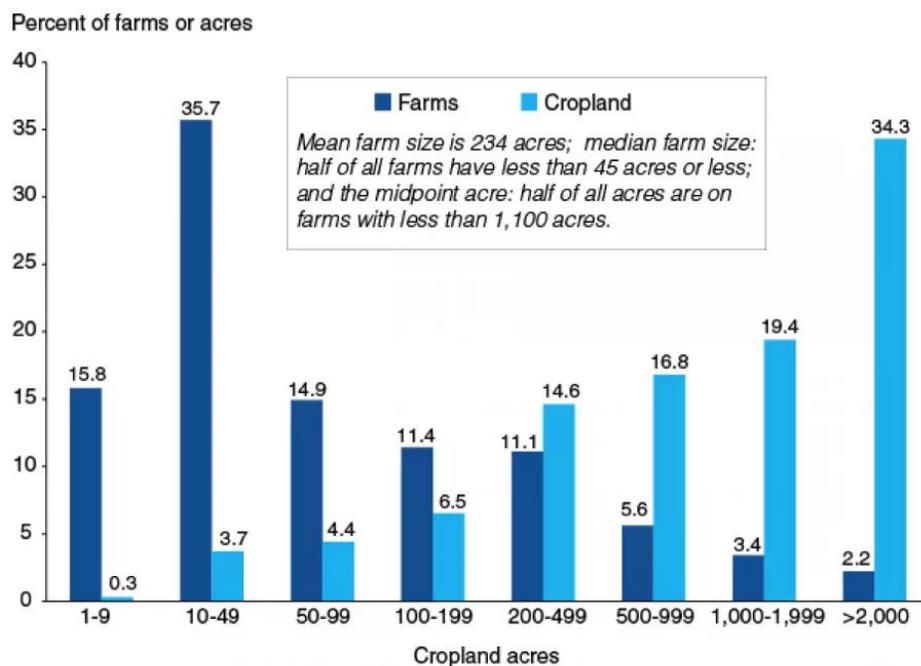
Figure 5: Farms, land in farms and average acres per farm, 1850-2012<sup>35</sup>



Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, Census of Agriculture.

<sup>35</sup> Ferdman, Roberto A. "The Decline of the Small American Family Farm in One Chart." *The Washington Post*. (September 16, 2014). Accessed May 12, 2018. [https://www.washingtonpost.com/news/wonk/wp/2014/09/16/the-decline-of-the-small-american-family-farm-in-one-chart/?utm\\_term=.c260231194f5](https://www.washingtonpost.com/news/wonk/wp/2014/09/16/the-decline-of-the-small-american-family-farm-in-one-chart/?utm_term=.c260231194f5).

Figure 6: Crop farms 2011<sup>36</sup>



Source: USDA, Economic Research Service using data from USDA's 2011 Agricultural Resource Management Survey.

As, you can see the issue with industrialized agriculture is much more than environmental issues. Business are dying and families are being directly affected, and soon, all of us will be directly affected.

### Chapter 3: What a Failing Food System Looks Like (economic discipline)

Based on what was discussed in chapter two of this paper, I believe it would be in our best interest to realize what our food system might look like in the event that it comes to the brink of collapse. In the context of this paper, let a *failing food system* be defined as a rapidly

<sup>36</sup> Ibid.

declining economic state in which our country is struggling to produce and provide food for its people due to a lack of resources, health concerns, etc. Now, it is probable that the industrialization of our food system has brought us to this point; however, it would be remiss of us not to admit that there are many factors within an industrialized food system that enable such a failure. For one, let us not forget the most basic of economic principles: supply and demand. Much of this hardship that we are potentially facing right now is our own fault. Consumerism in modern America is a massive issue, and it is extremely simple to understand why: when we demand it, they supply it. Plainly speaking, we demand too much—and in turn, we are supplied with too much. Most of us have become accustomed to a lifestyle in which we lack any sense of restraint, especially with regard to food. Ironically, we seem to feel the need to consume at such a high volume as if food or another good is going to run out on us. Ironically, is exactly what will happen if we continue to consume in such a way. Careless consumerism habits have embedded themselves in American culture, and are preceded by earlier generations. The encyclical written by Pope Francis, entitled *Laudato Si'*, asserts that, “Parents can be prone to impulsive and wasteful consumption, which then affects their children...our inability to think seriously about future generations is linked to our inability to broaden the scope of our present interests...”<sup>37</sup> Pope Francis is addressing the fact that poor consumption habits are commonly passed down from parent to child. Simply put, part of the reason our food system is failing is because, all around us, people are endlessly and mindlessly consuming.

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<sup>37</sup> Catholic Church, and Sean McDonagh. 2016. “On care for our common home: the encyclical of Pope Francis on the environment, *Laudato Si'*,” (2016), 162.  
[http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco\\_20150524\\_enciclica-laudato-si.html](http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html)

Another factor that is causing our food system to fail are its very own goals. The goal of an industrialized food system is to efficiently produce food that is quick, cheap and convenient; feed a large quantity of people; and receive high economic returns in exchange for it. However, with these system goals come unintended consequences. In *For Those Who Eat Food: Your Perishable Future*, John Ikerd describes these unintended consequences as, "...foods that are rich in calories and poor in nutrients. We have created a nation that is overfed but undernourished – overweight but still hungry."<sup>38</sup> Interestingly, even with this "cheap" and "convenient" food we are being offered, poor people in our country are *still* worse off than the rest of us—and NOT because food is too expensive. It is because the food they actually can afford does not meet their (or anyone's) basic nutritional needs.<sup>39</sup> This is indicative of a failing food system.

The food system is not providing nutrient dense food to anyone—most notably those who need it the most: the twenty percent of American children living in food insecure homes.<sup>40</sup> When the focus of the food system is more about the transaction of consumer money to agribusiness pocket, instead of offering wholesome, satisfactory food, it is clearly failing. Our current food system is unlike its historical counterparts in that the farming sector is the only faction that gains any economic competition. Please note, however, that this does not necessarily include the farm-level market. We know from chapter two that it is slowly disintegrating. That said, it is the large corporations that are the champions of the food supply chain.<sup>41</sup> This power gives corporations the ability to pick and choose who benefits from the profits. According to John Ikerd, corporate

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<sup>38</sup> Ikerd, "For Those Who Eat Food: Your Perishable Future," 2.

<sup>39</sup> *Ibid*, 3.

<sup>40</sup> *Ibid*, 3.

<sup>41</sup> *Ibid*, 4.

stockholders hold consumers as direct beneficiaries of their excess profits, leaving supply chain actors such as farmers, "...barely enough profits to survive. [Therefore] [n]ature and society suffer the inevitable consequences of a system that minimizes economic costs at the expense of nature and society."<sup>42</sup> The reality of this situation is that there is no economic incentive for corporations or consumers to invest in a different system because it takes time, money and patience: none of which people are currently willing to give up. The upshot is that these corporations put farmers under an immense amount of pressure and stress, simply so that their business can remain afloat economically. It is clear that this system and approach are unsustainable. It seems unlikely that these (very few) farmers can continue to carry this burden for much longer. At some point, if something does not change, this system will fail us.

Health is another important factor in the failing of a food system. I used to think anything produced by the USDA—including my gym teacher's food pyramid—had my best interest in mind. I was taught in gym class that as long as I followed what was on that pyramid and restrained from eating "too much" of something, I was going to be healthy. What we failed to understand at that time was that the food illustrated in that pyramid was losing its nutrients. That means that we were gaining nothing from following our teaching around the food pyramid. The idea of food in America, and what we are to consume has been repackaged and resold in so many ways that we have lost touch with the importance of really knowing what we are eating. Americans now experience a myriad of health issues that are likely as a result of the food we are eating, obesity being one of the most detrimental. This is apparent when we compare the decrease in percentage of income that is spent on food and the increase in income spent on healthcare, that has more

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<sup>42</sup> Ibid, 4.

than doubled since the 1950s.<sup>43</sup> The health problems that Americans are experiencing have even been attributed to the use of agricultural chemicals, growth hormones, antibiotics and GMOs.

This is yet another thing that is causing our food system to fail.

One of the best ways for us to understand the economics of industrial agriculture, its success and its subsequent failure are the concepts of value, scarcity and substitution. Professor Ikerd explains that these three concepts are that drive our plan for the future of agriculture in the post-industrial world because we can plan to avoid them in the pavement of the future of American agriculture. The reasons that industrial agriculture became such a success in America is based on these three economic principles:<sup>44</sup>

- (1) changing form, meaning the processing, manufacturing and packaging
- (2) changing place, meaning assembly, transportation and distribution
- (3) changing amount of time it takes to accomplish end goals, meaning accumulation, storage, allocation
- (4) mass marketing and mass production of agriculture

Initially, farmers were able to cut costs to increase the size of operations and gain the benefits of large-scale production. Where this started to go bad is because, as production expands, food becomes less scarce and prices fall. This forces farmers to cut costs to stay in business.<sup>45</sup> This is a representation of industrialized agriculture declining economic cost. Consequently, when food becomes less scarce good substitutes for food become scarce, as well. What this means is that no one farmer's goods are essentially any better than the next farmer, which technically makes food have economic value—however, not for a farmer in terms of

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<sup>43</sup> Ikerd, "For Those Who Eat Food: Your Perishable Future," 1.

<sup>44</sup> Ikerd, "Sustainable Agriculture: A Positive Alternative to Industrial Agriculture."

<sup>45</sup> Ibid.

maintaining a sustainable profit. Therefore, a farmer's only business goals turn into constantly trying to reduce costs.

We learn from success and failures of the past, which isn't necessarily a bad thing. We have seen great success in reducing food costs that almost anyone can afford to pay for the food they want or need. Although it is true that, in the industrial food system, it costs less to manufacture food in a factory than it does on a farm, farmers can expand their profit margins by reducing their reliance on purchase inputs and by reducing costs of expensive marketing. As a result, food costs for consumers may not even increase—and even if they do, Ikerd estimates that retail food prices would only end up being about 5 percent higher.<sup>46</sup> When we factor in the environmental and health effects caused by industrial agriculture, this increase becomes relatively minimal.

*Chapter 4: The Post-Apocalyptic Food System: The Future of the American Diet (environmental sociology discipline)*

In this chapter, let us imagine the unimaginable: food is not readily available when we want or need it to be. Picture yourself walking into the grocery store and seeing corn, some beans, eggs, maybe some oatmeal, perhaps even some milk— and almost nothing else. You fondly reflect on the days when you walked into the grocery store with your mom or dad and saw a whole row of colorful cereal boxes and you could pretty much choose any of the boxes you wanted. Perhaps you even recount the thought of the seemingly endless aisle of snacks and bags of chips from which you could choose. Sadly, this is no longer your reality. You must go to the

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<sup>46</sup> Ibid.

store for your daily, yet insufficient rations without any freedom to choose what you would like to eat. The American food system has collapsed.

By collapse, I mean that our food system has finally reached its tipping point. Tipping points are defined as, "...non-linear shifts [that] arise following a critical degree of change, resulting from either many small cumulative changes, or one large shock, "tipping" the system over a threshold and into a new stable state. Entering an alternative stable state is associated with a change to system function, usually being difficult to reverse or 'tip' back into the original state."<sup>47</sup> It is important to note that the term "alternative stable state," represents a transitional period that will be life's new normal, if you will. This is because it is nearly impossible to revert back to the old "normal," therefore, we are almost forced into resiliency—which is not entirely a bad thing. For our own referential purposes, I thought I would include a quote from an article that was published in *The Independent* as a way to get a true idea of what our future holds in the midst of a collapsed food system. A team at Anglia Ruskin University's Global Sustainability Institute developed a model of the food system that predicts a catastrophe in the food system by the year 2040. The director of the Global Sustainability Institute, Dr. Aled Jones, explained:

We ran the model forward to the year 2040, along a business-as-usual trajectory based on 'do-nothing' trends—that is, without any feedback loops that would change the underlying trend. The results show that based on plausible climate trends, and a total failure to change course, the global food supply system would face catastrophic losses, and an unprecedented epidemic of food riots. In this scenario,

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<sup>47</sup> T. Benton, D. Fairweather, A. Graves, J. Harris, A. Jones, T. Lenton, *et al.* "Environmental tipping points and food system dynamics: Main Report." *UK: The Global Food Security Programme*, (2017), 1.

global society essentially collapses as food production falls permanently short of consumption.<sup>48</sup>

When something like this happens, one of the most significant questions we might ask ourselves is: “How could we let this happen?” Note that the key word here is *we*. According to Jared Diamond, it is the failures of group decisions of a whole society that contribute to the collapse. So, to find an answer to our question, I thought we might explore Jared Diamond’s road map of factors contributing to failures of group decisions:

#### JARED DIAMOND’S ROAD MAP OF FACTORS CONTRIBUTING TO FAILURES OF GROUP DECISION-MAKING

- (1) “Groups may do disastrous things because they failed to anticipate a problem before it arrived. Keep in mind that a group may not have any experience of such problems and might not have been sensitized to the possibility.”<sup>49</sup>
- (2) “After a society has or hasn’t anticipated a problem before it arrives, involves its perceiving or failing to perceive a problem that has actually arrived.”<sup>50</sup>
- (3) “Societies might fail even to attempt to solve a problem once it has been perceived.”<sup>51</sup>
- (4) “Even after a society has anticipated, perceived or tried to solve a problem, it may still fail for obvious possible reasons: the problem may be beyond our present capacities to

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<sup>48</sup> Doré, Louis. "Society will collapse by 2040 due to catastrophic food shortages, says study." Independent, 2015. <http://www.independent.co.uk/environment/climate-change/society-will-collapse-by-2040-due-to-catastrophic-food-shortages-says-study-10336406.html>.

<sup>49</sup> Diamond, *Collapse: how societies choose to fail or succeed*, 420.

<sup>50</sup> Ibid, 424.

<sup>51</sup> Ibid, 427.

solve, a solution may exist but be prohibitively expensive, or our efforts may be too little and too late.”<sup>52</sup>

In the interest of length, I did not include Diamond’s explanation and examples of each factor. However, this is an important skill for us to have as we try to understand how we could let our fate unfold right in front of our eyes. I assert that our post-apocalyptic food system would contain a society of people who are forced into self-reflection. In addition to struggling for food, we ought to be wondering if it was all worth it: the mindless consumerism, the land degradation, the profit, the exploitation of animals and farmers. However, it is my hope that we come up with sustainable practices for our land, animals, businesses and people. It is through this hardship that we must rebuild—for the better.

Earlier in this paper, I discussed Professor John Ikerd’s idea of paradigm shifts in terms of agricultural and economic change. This idea is especially important when thinking about what will happen to the United States sociologically in the event of a food apocalypse. Ikerd explains that new paradigms often arise to replace the old ones, when it becomes evident that the old paradigm is no longer producing benefits, but creating serious problems. He believes that American agriculture is possibly in the midst of a paradigm transition. Ikerd offers three very important factors that foretell the end of dominance for the industrial paradigm culture<sup>53</sup>:

- (1) The logical, economic and social gains from industrialization of agriculture have already been realized, which leaves very little left to be gained from any further specialization, mechanization and routinization of industrial agricultural production and marketing.

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<sup>52</sup> Ibid, 436.

<sup>53</sup> Ikerd, “Sustainable Agriculture: A Positive Alternative to Industrial Agriculture.”

- (2) We face increasing environmental, societal and economic problems that are clearly associated with the continuation of industrialized agriculture. Ikerd estimates that the marginal costs of industrialization exceeded its marginal benefits about two to three decades ago.
- (3) There is evidence to support that the Industrial era is already over in sectors outside of agriculture and that agriculture will soon follow.

As we have begun attempting to apply industrial systems of production to other situations in agriculture, we are realizing that industrialization just doesn't seem to be the right fit. This is a perfect indicator of the need for a paradigm shift. Sectors that have the flavor of post-industrial era paradigm shift continue to be the foreground to industrial agriculture farmers: alternative agriculture, bioeconomic farming, community supported agriculture and local food systems.

Interestingly enough, I found in my research that both Ikerd and Steingraber believe there will soon be an environmental shift in America. As previously mentioned, Ikerd believes that, "American agriculture is in the midst of a great transition." Dominance of the industrial paradigm of agriculture is ending.<sup>54</sup> Steingraber believes that the generation of which her children are a part (millennial generation), "[W]ill, by the time [the generation] is her age, consider it unthinkable to allow cancer-causing chemicals, reproductive toxicants and brain-destroying poisons to freely circulate in our economy. They will find it unthinkable to assume the attitude of silence and willful ignorance about our ecology."<sup>55</sup> According to experts, it would seem that the environmental sociology of Americans—with respect to agriculture, has heightened.

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<sup>54</sup> Ibid.

<sup>55</sup> Steingraber, "Three Bets," 5-6.

## *Chapter 5: Building Sustainable Food Systems*

It is evident that a food system based on industrial agriculture is unsustainable. We must collaborate to build a stronger, more robust—and ultimately sustainable food system. I propose that we focus mainly on community-based food systems in an effort to move away from large, corporate control. In the same way that towns and cities have local governments in the United States, it would be beneficial for us to have community-based food systems that are specific to each environment. We must work with what we have in the ways of farming land post-food apocalypse. There are numerous ways we can rebuild our food system in the post-industrial food system. In this paper, I will focus on community-based food systems and high-tech, plant-based meat investments. I will discuss these in terms of their environmental, economic and cultural factors.

In an effort to cultivate a more robust crop-growing system, we will drastically reduce the size of lands that are farmed and give the rest of these lands time to regenerate (in the hopes that they can). This will be an intensive process, but it will take the help of communities gathering together to rise from the ashes, so to speak. In a community-based food system, it is my hope that members of the community will both consume the food, and help cultivate and harvest it, too. It is probable, at least in the beginning stages, that all communities can have their own individual food system; however, a goal of this system is to find a way to make nutrient rich foods accessible to absolutely everyone in a sustainable manner. This chapter discusses the environmental, economic and cultural factors of our new food system that we must consider and evaluate.

The desire for personalization and establishing relationships speaks to a much more intimate structure. Many people have little faith in systems run by large corporations with significant governmental involvement. They do not believe that these systems have a commitment to the environment and/or to their health. People tend to feel more secure and socially responsible when they can connect with and support a food system that is sourced locally or regionally. The personalized nature of that scale also promotes and fosters an investment and loyalty not seen with large corporations. Growing concerns for environmental, social and ecological costs have allowed for more ecologically sound systems of production to become more competitive and we have begun to create a small, but nice, niche market of goods that are produced by socially and ecologically responsible means.

#### ENVIRONMENTAL FACTORS

As we are aware, our former food system put a serious strain on the environment. With a more local food system, we will be transporting much less and using far less natural resources. In addition, our new food system would be climate-appropriate and grow on land that has already been farmed on. One of the most important factors is that we will recycle as much waste as possible. We plan to create a whole new system for waste: compost will become a large part of our lives. Not only is it better for our environment, but it is also better for our soil. With a focus on mindful consumption, we hope to be producing much less reusable waste. When not searching for the cheapest, easiest, fastest way, a lot can be done to make a huge difference. That large-scale corporate mindset will change with respect to our food when we implement this system. We will take much pride in the way we care for what we put into our bodies and how that relates to our surrounding environment.

#### ECONOMIC FACORS

In order to achieve economic sustainability, our community-based food system must provide a certain amount of opportunity for each community. These include providing business opportunities, the ability to sustain farmland, to build local infrastructure and to develop a workforce.<sup>56</sup> The goal is for each community to be able to sustain itself based on its own needs and its own people. This is particularly important because no economy and no community should be treated the same, as all have their differences. We must be able to develop the skills that are needed for this sustainability through schooling, classes and an overall willingness to learn. At rebuilding times like these, we need to be willing to go change our skills and our habits, otherwise nothing will get better for us.

#### CULTURAL FACTORS

One of the most important aspects of our new food system is that we want it to be a social experience. We have gotten so used to the idea of industrialized factories and large-scale farms producing our food and it has taken away our appreciation for food. By promoting the cultivation of food as a social experience, we hope to also welcome a strong commitment to providing all members of a given community equal access to healthy foods. I deduce that engaging community members with the growth of their own food, that the production of it will result in much more wholesome and careful consumption. The idea here is *care*. If people care about harvesting their own food, our hope is that we will eat much less quantitatively but more qualitatively; we will eventually remain committed to producing food with integrity; we will develop a more respectful relationship with the Earth; and we will break the habit of mindless consumerism in America.

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<sup>56</sup> Capstone Project. "Building a Community-Based Sustainable Food System." *Urban & Regional Planning*. University of Michigan, (2009), 29.

Keep in mind that this particular food system is not comprehensive, it is only a supplement for communities who have the resources to achieve a more community-based plan for produce. I am fully aware that this is not plausible for all communities, and in all climates in the United States. However, I feel that reaching those communities who are willing to work together is a great step in preparation for a new age paradigm shift for American agriculture.

Throughout the process of writing this paper, I have also done extensive research on the high-tech meat industry. This has brought me to the work of a former professor of mine, Garrett Broad. In addition to being a professor, Dr. Broad is an author and an activist. His work focuses on food systems, environmental sustainability and animal welfare. Professor Broad's book entitled, *More Than Just Food: Food Justice and Community Change* inspired me to write this paper. Professor Broad also wrote an article on why the debate for high-tech meat is important, called *Why We Should Make Room for Debate About High-Tech Meat*. This article is pertinent to this paper because high-tech meat gives us something to fall back on in the event that we might need it to sustain the American population in the future.

## SOCIOLOGICAL FACTORS

As a vegan for over four years, I think it would be beneficial for me to talk about the environmental sociology is involved in the lifestyle, as well as the long-term effects of veganism. For me, going vegan was about feeling better after eating. I simply did not like the way my body felt while digesting both meat and dairy products. Initially, I had no ties to ethical treatment of animals or a sense for how hard animal agriculture is on the environment. However, when I first went vegan, it was not necessarily as popular or "mainstream," as it is today. So, when I was often asked, *why are you vegan? Or vegan? What is that?*, I realized I needed to start having some answers. As I did more and more research on why people actually live a vegan lifestyle, I

became increasingly proud of my decision: animal agriculture is responsible for and estimated eighteen percent of greenhouse gases; the livestock sector is “one of the top...most significant contributors to the most serious environmental problems, at every scale from local to global”; animal products cause twenty-seven percent of our water footprint; in order to produce one steak, 7,500 liters of water is needed; animal agriculture is responsible for around ninety-one percent of the destruction to the Amazon rainforest; the world’s cattle consume food that equals the caloric needs of 8.7 billion people.<sup>57</sup> Being vegan has, most importantly, taught me the importance of buying local, sometimes organic, goods. Buying local produce supports the farmers in my area and even encourages me to try to grow my own. What is most special about being vegan is constantly learning that a choice you have made seems to have limitless benefits. It sparks innovation to try new food combinations, which I think is inspiring if we may live in a world one day without the accessible food system we have today. Veganism is simply about consciousness; it is about reaching people and teaching them about what is on their plate and where it came from or how it got there. I think veganism paves a kind of community-based structure that can really benefit the transition into post-industrial agriculture. I wanted to be able to offer you an opinion about veganism other than my own, so I reached out to my friend Jessica—who is also a vegan—to share her story and her thoughts about the benefits of veganism:

At first, being vegan was a health choice for me. I wasn’t digesting dairy well, and I had already been vegetarian for about a year so taking the next step toward veganism was going to be best for me. About a year into becoming vegan, it became so

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<sup>57</sup> “16 Facts That Show How Going Vegan Helps Stop Climate Change.” *PETA UK*. (January 16, 2018). Accessed May 15, 2018. <https://www.peta.org.uk/blog/how-going-vegan-helps-stop-climate-change/>.

much more than a health choice for me. Focusing on exactly what I was eating opened my eyes to so many issues that are linked with the food we eat—not only the health issues that originate from the way we process our food, but the harm we are doing to animals, and the harm we do to our environment. Veganism has become a journey for me that has taught me so much about the world, and through which I have found my activist voice and I have found a passion. I am now a conscious, more educated consumer who decides to put things in my body based on ethical and informed decisions.<sup>58</sup>

As you can see, two completely different vegans, share a similar story. I find that many vegans I meet share similar values to me, which seem to cultivate after being vegan over an extended period of time. I encourage you to imagine how different the American food system might be if we were all even slightly more conscious of what we eat.

## ENVIRONMENTAL FACTORS

One important thing to remember about the food apocalypse is that if our food system fails, one of the most vulnerable food sources is animals. Animals will be scarce, as we will no longer be able to feed or contain them. What we need to do in order to rebuild is explore what is called the post-animal bioeconomy. The post-animal bioeconomy is the scientific research and activity that is used to recreate more sustainable processes than industrialization. This is where high-tech meat comes in. Companies that are currently in the beginning stages of this high-tech, post-animal bioeconomy are companies like NotCo, Finless Foods and Beyond Meat. NotCo is a Chilean startup brand that uses both plant science and artificial intelligence to recreate various dairy products like mayonnaise. The company Finless Foods uses what is known as cellular

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<sup>58</sup> Jessica Claire, email message to author, May 11, 2018.

agriculture in order to create lab-grown seafood. They simply and harmlessly take a few cell tissues from animals.<sup>59</sup> At Beyond Meat, their goal is to completely replace animal protein with plant protein.

## ECONOMIC FACTORS

I did some personal research in terms of testing out plant-based replacements for animal protein. I had heard from a vegan about a restaurant called Christopher's Kitchen in Palm Beach Gardens, Florida, that uses absolutely no meat, but also does not use any technical substitutes for meat. They simply create plant-based protein dishes that have the same texture, taste and essence of meat. So, I decided to try Christopher's Kitchen for myself in March. I ordered a "tuna" salad sandwich that was made from chickpeas, other various creamed legumes and vegetables and non-dairy mayonnaise. It was delicious: not only did it taste like tuna salad, the manager of the restaurant informed us that it had more protein than tuna, as well. In addition, we waited nearly an hour for a table, as the restaurant was completely packed. It was obvious that meat-eaters and non-meat eaters alike love the food at Christopher's Kitchen. They are also gaining a healthier, environmentally and ecologically sustainable alternative. There was only one problem I had with Christopher's Kitchen: the bill. My plant-based, tuna salad sandwich that came with a side of salad ended up costing around \$20. This high-quality, plant-based alternative to meat protein is expensive, and not only at restaurants. Beyond Meat's "The Beyond Burger," that is made from plant proteins, is sold at about \$12 per pound, which makes them far more expensive than ground

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<sup>59</sup> Broad, Garrett. "Why We Should Make Room for Debate about High-Tech Meat." *Civil Eats*. (October 09, 2017). Accessed May 14, 2018. <https://civileats.com/2017/09/28/why-we-should-make-room-for-debate-about-high-tech-meat/>.

beef that sits at about \$3.50 per pound. Even grass-fed animal products that sell for around \$10 per pound.<sup>60</sup>

For the purposes of my research, I had an Impossible Burger that is now being sold at a restaurant in Pittsburgh called Burgatory. I have included the full advertisement for the Impossible Burger at Burgatory on the next page:

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<sup>60</sup> Ibid.



## ALL BURGER. NO BEEF.

The Impossible Burger is a delicious & meaty burger created for meat lovers & made entirely from plant-based ingredients, like wheat protein, potato protein & coconut fat. This burger is significantly better for the planet using a fraction of the water and the land to produce.

Our Impossible Burger is topped with White American Cheese, Shredded Iceberg, Dill Pickles & Roasted Garlic Mayo. We're happy to make it vegan, complete with Vegan Cheddar & Mayo, on request. It's a devilishly good burger experience loaded with a ton of sustainable ingredients.

MEAT & VEGGIE  
LOVERS  
UNITE  
-- over the --  
IMPOSSIBLE!

This advertisement is so important for the future of food and agriculture. It was created with meat lovers in mind, while working toward environmental initiatives. The Impossible Burger is a great start in the sustainable agriculture direction. For someone who does not eat meat, trying the Impossible Burger was bizarre: it tastes like and has almost the exact texture of meat. After almost four years without tasting meat, I cannot say for certain how true that might be for an avid meat eater; however, to me, it was the exact same. It was so alarming to me that I had to make sure I ordered the right burger, as I was afraid it was actually beef! This burger looked exactly like a traditional one: it was well-done on the outside and, when I bit into it, it was pink and red on the inside. I was astonished. Not to mention it tasted great! This kind of high-tech, plant-based meat is a far cry from the traditional black bean or veggie patty alternatives for meat that us non-meat eaters have had to eat for years. To me, this burger seems like a legitimate alternative to meat that had little to complain about by meat and non-meat eaters alike. I will mention that the burger was more expensive than a traditional beef burger, at a cost of about \$15. As previously mentioned, high-tech meat and plant-based protein is historically more expensive than beef. It is predicted, however, that we can offset these costs as high-tech meat becomes more popular in the future.

One thing that could offset these costs in the future is investment. When we raise investment in these companies, there is more room for innovation and exploration. This means that production can become a bit more effective, while staying ecologically sound and nutrient-dense. Investments in high-tech meat are increasing and it is gaining some popularity among the high-profile investors, as well. For example, Bill Gates and Richard Branson have made large contributions to these high-tech meat companies, despite the fact that they are still being studied

in labs and not necessarily completely open for public consumption.<sup>61</sup> What we really need is for people to engage with this movement. After all, it might be the only plan we have to fall back on in the event that our food system crashes. Professor Garrett Broad writes:

[I]f biotech boosters are really interested in dialogue, it's important for them to engage with critical histories about food and technology, which will help them understand why earlier promises to sustainably feed the world have fallen short. Equity should be at the center of their work and addressing the concerns of the most vulnerable eaters and food producers must be part of their bottom line.<sup>62</sup>

We ought to be optimistic and on the lookout for alliances and collaborations that are beginning to form between scientists, investors, farmers, businesses and consumers. Our focus should be creating opportunity for the American people by giving them incentivized reasons to want to treat their environment better. We need more activism and voting with dollars. We need a change in meat agriculture and produce agriculture, which can be done. It is also very important that consumers have more exposure to this market. We are starting to make the changes toward the post-industrial agriculture movement without even realizing it. We are at the edge of a paradigm shift and a great transition. We must choose: to fail or to succeed?

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<sup>61</sup> Ibid.

<sup>62</sup> Ibid.

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