

# SUMMARY THE FATE OF FOOD

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# **Summary of “The Fate of Food” by Amanda Little**

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What We'll Eat in a Bigger, Hotter, Smarter World

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# Introduction

People today share growing fears about political and environmental instability. In 2017 alone, we saw Hurricanes Harvey, Irma, and Maria tear through American cities; furthermore, citizens of Miami experience routine flooding and worry the entire state of Florida will be underwater in just two years. People in upstate New York experience one-in-a-thousand-year blizzards and find themselves unable to get out of their driveway for two weeks. People are impacted by droughts and forest fires that scorch California each year. The worst part? People are increasingly worried that the government won't come to their rescue when a disaster hits. And it's not just the United States but every country in the world today is facing environmental volatility. So how screwed are we?

Before we discuss the perils of modern farming, it's important to remember the achievements of industrial agriculture. Without the advent of agribusiness, as many as two billion might not even exist. Farms today globally produce 17 percent more calories per person than they did in 1990. Today, around 800 million people still suffer from chronic hunger, but just thirty years ago, that number was 1 billion. Additionally, the price of food has fallen and we spend about 13 percent of our budget on food. In the 1950s, households spent about 30 percent. Even more, we've turned to processed food to save time and money. Unfortunately, modern farming is contributing to waste overconsumption, poorer nutrition, and reliance on fewer, more concentrated farms to feed the world. Even worse, the methods devised to feed billions are backfiring on the environment.



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# The Drawbacks of Modern Farming

It's no secret that agriculture is more productive today than at any other time in human history. With the advent of modern machinery, improved pesticides, and even better seeds, we have been able to increase the amount of food available to the public. Unfortunately, while modern farming techniques have increased productivity, it has also become a major contributor to the current environmental crisis.

Ever since humans have been growing food, the common goal was to produce larger, better crops with less effort. In the mid-1800s, the first reaping machines arrived on the market and by 1903, the steel plow and the combustion-engine tractors were making farming quicker and easier. Work that once required many days of hard human and animal labor now took just a few hours. Charles Darwin then published a book on cross-fertilization in plants, and before long, scientists were applying his ideas to breed better corn and wheat. Finally, the invention of hybrid seeds combined with chemical pesticides and fertilizers brought on a shift in farming known as the Green Revolution.

In the 50 years following World War II, the global food supply jumped 200 percent! As a result, the world's population more than doubled. The Green Revolution became a milestone for humanity. Agribusiness allowed for immense quantities of wheat, soy, and corn to be produced. Corn was then processed into products like corn syrup, food additives, and meat. Of course, with every gain in food production, there has always been a cost. Excess fertilizers on farmland run off into lakes and oceans, causing algae blooms that suffocate aquatic life. Furthermore, pesticides have caused bees, beetles, and butterflies to die in great numbers. And the pests that killed crops became resistant to these chemicals, requiring even stronger ones.

One of the biggest downfalls of the Green Revolution is its contribution to climate change. The greenhouse gases threaten the future of the world's

farms, and they are also produced by the farms themselves, specifically the big mechanized ones. Today, food production now accounts for about 1/5 of total greenhouse gas emissions each year, meaning that agriculture contributes more than any other sector to climate change. Still, an even greater failure has been the inability to solve the problem of food distribution. The Green Revolution has created a food system that does not nourish people equitably; some populations are severely overfed while others are severely undernourished. The supply chains remain incapable of distributing food equitably, and so approximately 1/3 of the food produced goes to waste.

So what is the answer? Some food advocates believe we should dismantle the entire system and go back to the basics of agriculture. They believe we should stop using chemicals and genetic modifications, and while this may sound ideal, it isn't necessarily practical. Because of technology, we have been able to dramatically cut the costs of farming, leading to more affordable food. Without technology, we would have to raise the cost of food, leaving poor communities hungry and penniless. Instead, the answer may be a combination of technology and traditional farming to feed a more populated planet.



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# The Great Impact on the Fruit Industry

In May of 2016, Andy Ferguson woke up at 4:30 a.m. like he always did, and immediately noticed the frost on his bedroom window. But he wasn't too worried; after all, the weather forecast had said a low of 30, and his apple trees could handle that. When we drove to the digital weather station and looked at the recorded temperature ranges during the night, his stomach dropped. Around two a.m. the temp dropped to 26 and hadn't budged. Unfortunately, any sustained period of temperatures under 29 posed a real threat to his fruit trees. He quickly walked to the nearest Honeycrisp tree and opened up an apple. Inside, where there should have been green living tissue, it was blackish brown. Exactly what you're hoping not to see.

Fruit is incredibly sensitive to temperature variation, making it one of the most vulnerable crops to extreme weather. And when we look at what is happening to fruit crops, we can better gauge the state of the climate. What we see, however, isn't good. In 2016 when Ferguson discovered the dark sludge in his first apple, he didn't yet know the full impact of the freeze. Ultimately, those four hours of below-freezing temperatures in May killed six million infant apples, resulting in more than \$1 million in lost harvest. Ferguson would go on to assess the damage in surrounding areas, compiling data to present to the governor to declare a state of disaster and help uninsured farmers with the cost of their crop damage.

If these extremes become the new normal, Ferguson and his fellow growers would need to create a plan to keep apples in their region alive. Farmers all over the country are experiencing similar extremes and loss in crops. To dive deeper into this issue, researchers at Michigan State University dug through a century's worth of weather-collecting data. Throughout their research, they discovered that before 1940, there had been less than ten spring freezes per year. But in recent years, that number has jumped to almost 20. Even worse, this increased freezing is being compounded with



general warming. And fruits like cherries, apples, and peaches require cold weather to blossom properly in the spring.

In areas like Michigan, fruit trees have adapted to long periods of bitter cold. To survive the winter, trees accumulate what is known as chilling units. When the weather warms up, the trees build up more and more chilling units, resulting in “super chilled” trees that bloom too early. For example, in 2016, New Hampshire, Connecticut, and Rhode Island saw their peach trees bloom over a month ahead of schedule. When this happens, the trees become at risk when the spring freeze inevitably hits. In 2016, crops in all three states suffered a 100 percent loss due to the early blooming.

But we aren’t only seeing devastating losses in the bitter cold north, California experiences dry droughts, affecting countless crops, including strawberries, almonds, and grapes. The entire world is experiencing similar losses. Farmers are turning to temporary solutions to help. Some use frost fans to help cool the warm air, while other orchards are even utilizing helicopters to fly overhead in an attempt to push the warm air down. And horticulturists are working on breeding new trees that can withstand drastic changes in temperature.



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# The Answer to Drought Relief Could Be in Technology

The key to allowing crops to grow and livestock to be raised is water. Unfortunately, water is becoming increasingly scarce as extreme droughts are affecting nearly every continent. So how can we save our crops and animals without water? Well, one possible solution is the use of GMOs. GMOs are genetically modified organisms, and many people are cautious and wary of them. But many scientific organizations, including the World Health Organization, have decided that GMOs are not harmful to human health; in fact, in many parts of the world, their use is critical for survival.

For example, the Kenyan government banned the use of GMO crops in 2012 after a tireless debate. But since the ban, the Kenyan government is reconsidering its position due to new research on genetically modified corn. Today, labs have created seeds that are proven to be resistant to both pests and droughts. The pest-resistant plants allow for greater harvest and even cuts down the use of toxic pesticides. Solving the problem of drought tolerance, however, is a much harder problem to solve. Fortunately, there has been much research to suggest that drought-resistant plants are on the horizon.

In addition to engineering new crops to survive less water, we must also learn how to successfully irrigate the land and create new areas of fertile farmland. Israel, although an arid desert nation, has become 95 percent agriculturally self-sufficient due to its innovative high-tech irrigation techniques. Because water is a precious resource, Israel's irrigation techniques include desalinating seawater and recycling wastewater. They even have software that monitors the vast water network, catching tiny leaks in pipes before a catastrophic burst happens. Due to its monitoring techniques, the country only loses about 10 percent of its water supply. The United States, however, loses up to 30 percent of its water every year. The impressive, yet expensive system has been adopted in cities around the world - but only by those that can afford it.



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# Indoor Farming is a Promising Development

One of the biggest problems the world faces is finding available farmland. Take China, for example, who needs a landmass to support over a billion people. With this many people, it's hard to find enough land for both its population and its crops. So how can we find more land to grow crops on? Well, there's a promising new development on the rise: indoor farming.

In the previous chapter, we talked about GMOs which focused on altering the seeds and plants themselves to survive in new environments. Indoor farming, however, is about changing the environment. Of course, this is nothing new. The use of greenhouses dates back to the Romans, but indoor farming today is much more advanced. Take a look at the Netherlands who has been using indoor farming for decades because they simply don't have the terrain for farming. Additionally, Japan has developed new greenhouses in response to a 2011 accident at the Fukushima nuclear plant. New Jersey-based AeroFarms has begun developing vertical farms that are pesticide-free and use less water and fertilizer than outdoor farms. But that's not all. They use something called aeroponics, which eliminates the need for soil. Instead, the plant's roots dangle freely in the air and are fed with a mist packed with necessary nutrients.

Like modern farming, however, indoor farming comes with its drawbacks. First, the artificial light needed for the plants results in an enormous increase in energy consumption. Second, many of them produce thousands of tons of plastic and agricultural waste - like those found in Almeria, Spain. With these serious drawbacks, advocates of indoor farming do not believe the practice should replace conventional farming entirely. Instead, indoor farming should only be utilized when producing fruit and vegetables that are sensitive to extreme climate change. Crops like corn, wheat, rice, and soy should continue to be grown traditionally.



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# Radical Innovations in the Meat Industry

When you look into the diets of the seven billion people on this earth, you'll see that protein is one of the most important staples. From seafood and chicken to pork and beef, there is a range of animals, each with its own sector in the meat industry. The meat industry has a great impact on the world's climate change; luckily, it is also investing in some radical technological innovations in agriculture.

The world's oceans cover 70 percent of the earth's surface, yet only 2 percent of the world's food supply comes from the oceans. Therefore, advocates of fishing believe the future of food lies beneath the surface. But making industrial fishing sustainable is simply impossible. After all, overfishing has already affected countless species. Even worse, warming ocean temperatures are affecting even more. Therefore, some fish farmers believe the future of food lies in technology. Salmon farmers in Norway, for example, have invested millions of dollars in new closed-environment systems. In these systems, the salmon is protected from warming temperatures, parasites, and waste. These systems will one day be essential as new environmental restrictions are put on the traditional farming industry.

Additionally, raising fish for food has many advantages over raising land-based animals. First, fish consume far less food themselves, and it only takes about a pound of feed to produce a pound of salmon. Compare that to about seven pounds of feed needed to produce just a single pound of beef. Second, the carbon footprint of raising livestock is quite considerable and is responsible for about 15 percent of all global greenhouse gas emissions. Wealthy, eco-conscious farmers can lessen the impact by adopting managed grazing techniques or even experimenting with cattle-cloning. However, these solutions are far too expensive for the majority of farmers.

Some companies are considering reinventing the meat industry entirely. Just take a look at the Impossible Burger, which is a plant-based

“alternative meat” burger. Even Silicon Valley is getting involved with Memphis Meats. With the help of a stem-cell biologist, Memphis Meats grows its product in a lab from samples of fat, muscle, and connective tissues. The lab then produces “meat” that tastes exactly like traditional beef and poultry. Even though the lab can produce a product that is near-identical to meat, lab-grown meats will never replace animals, especially in developing countries. Therefore, meat producers must continue to work on improving their techniques to create a more efficient and environmentally-friendly industry.



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# Solving the Food Waste Problem Begins with Prevention

In chapter one, we discussed the many consequences of the Green Revolution. One of those was the increase in food waste. Today, that consequence has only grown. Each year, Americans throw out 52 million tons of food; furthermore, another 10 million tons are trashed before they even make it to the store. Food waste has proven to be a challenging problem, but how can we solve it?

Eliminating food waste begins with education and prevention. You see, ironically, the people who end up contributing the most waste are often those trying to adopt a healthier diet. Oftentimes, these people try something new that they or their family end up not liking. Or they throw food away thinking that it's gone bad. People are so focused on the aesthetics of food, that if something looks slightly misshapen, bruised, or discolored, they simply won't eat it. So the next time you want to throw something away that is "ugly," check to see if it is really bad to eat. Furthermore, we are too focused on the "Best if used by" date on the package. But those dates are not official or fixed. Milk, for example, is usually fine a week or so after the date printed on the carton. The rule of thumb is that if something looks and smells fine, it's probably safe to eat!

While we can certainly do our part, cities around the world are working to do their part as well. Cities like Copenhagen and London are launching programs to connect restaurants and markets with shelters and food banks. Restaurants and markets can then donate their unsold food to those who need it. Lastly, the final step in solving the problem of food waste is composting. While many people believe composting solves the problem entirely, in reality, that is not necessarily the case. In fact, cities with composting programs have some of the highest percentages of food waste. This is because people are more likely to throw out more thinking that composting doesn't count as waste. Instead, we should turn to prevention.

For instance, embracing frozen fruits and vegetables over fresh is one of the best ways to help cut down on waste. The nutritional value is the same and they won't go bad! Ultimately, you should be aware of the food choices you make and be conscientious of what you throw away.



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# Final Summary

Since the Green Revolution, our world has been drastically changing. With more food available to us, our population has increased, ultimately affecting our environment. As a result, we need to rethink agriculture to limit our carbon footprint and find sustainable ways to feed our growing population. The best way to do this is to adopt the best traditional methods and modify them with new technology and techniques. Luckily, many farmers and scientists are already leading the movement towards more sustainable farming.



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