

Four Futures of Food

global food outlook alternative scenarios briefing





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ABOUT THE ...

The Institute for the Future

The Institute for the Future (IFTF) is an independent, nonprofit strategic research group with more than 40 years of forecasting experience. The core of our work is identifying emerging trends and discontinuities that will transform global society and the global marketplace. We provide our members with insights into business strategy, design process, innovation, and social dilemmas. Our research spans a broad territory of deeply transformative trends, from health and health care to technology, the workplace, and human identity. The Institute for the Future is located in Palo Alto, California.

The Global Food Outlook Program

Food sustains and nourishes us, and it also increasingly connects us to a global food web that is intertwined with politics, economics, environmental concerns, culture, and science. This global food web is undergoing rapid change, presenting considerable challenges and significant opportunities. IFTF's Global Food Outlook Program provides a distinctive perspective on the global food web, food markets, and the connections and discontinuities between every day choices and large-scale challenges. We help organizations work with foresights, disruptions, and dilemmas to develop insights and strategic tools to increase their effectiveness and resilience in a volatile world.

1 | Introduction

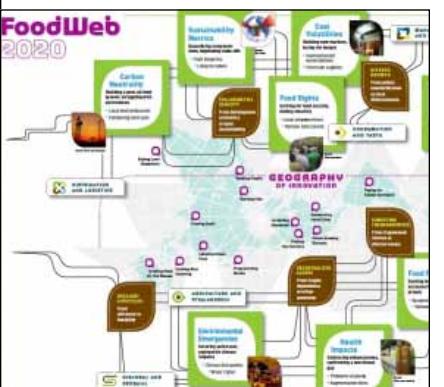


When imagining the future, we often assume things will keep moving in the direction they have been in the recent past. In the global food web, this means we would see continued growth in global efforts to streamline the way food is bought, prepared, and consumed, and the spread of novel food products. At the same time, food-related health problems such as diabetes and heart disease would persist in developed markets, while the developing world would continue to experience food insecurity issues.

But is this really the future of food?

WHAT IS THE FOOD WEB?

The **food web** is a broad concept we explored in our report, *Food Web 2020: Forces Shaping the Future of Food*. It contains food supply chains and food systems, placing them in the context of natural environments, cultural complexity, and globalization. To read the report, go to www.iftf.org/FoodWeb2020.



Source: IFTF



ALTERNATIVE FUTURES SCENARIOS

Growth, constraint, collapse, and transformation are four distinct but plausible directions of change identified by Jim Dator, director of the Hawaii Research Center of Futures Studies, in his work on alternative futures scenarios.

GROWTH: ↗

current trends and conditions, both good and bad, continue to grow as they have in the past.

CONSTRAINT: ⏪

society, either led by governments or grassroots efforts, takes austerity measures to constrain the behavior of groups of people or individuals.

COLLAPSE: ⚡

change in which major social systems are strained beyond the breaking point, causing system collapse and social disarray.

TRANSFORMATION: 🌐

fundamental transformation of a society or system that signals a break from previous systems.

While linear growth represents one potential shape of the future, we can learn from recent history that constraint, collapse, and transformation are other ways of thinking about how change can occur. For example, China averted an infrastructure breakdown by **constraining** population growth with its one-child policy. Western housing and financial markets **collapsed**, surprising those who assumed past trends would continue. And the Internet and, more recently, social media, **transformed** the way the world communicates information—leaving traditional media outlets scrambling to adapt.

We can also find examples of these four directions of change in the global food web's history:



Source: Flickr user Paco Calvino

GROWTH: In the early 1970s, the United States Department of Agriculture adopted policies that encouraged farmers to produce as much food as their land could bear. This reversed decades of government caps on production. The ensuing growth in the availability of commodity crops like corn helped bring down the prices of animal feed, and ushered in a boom in meat consumption. Throughout the world, obesity has increased dramatically, while the number of people who go hungry recently passed the ominous milestone of one billion globally.



Source: State Library of New South Wales

COLLAPSE: The Dust Bowl of the 1930s resulted in a collapse in food supplies. After years of wet—and productive—weather, plains states and provinces in the United States and Canada were hit with a severe drought. This, along with problematic farming practices, saw fertile soil give way to dust, which displaced millions of people and led to widespread poverty and hunger. Today, fisheries worldwide are facing various degrees of collapse.



Source: Flickr user Vanessa Stewart

TRANSFORMATION: In the past few decades, refrigeration has paved the way for stable food storage, ready-to-eat meals, and massive global trade in perishable fruits, vegetables, and meats. In turn, this new technology has fundamentally reshaped our relationships with food, and with each other. Family members can individually heat up their own dinners; meals can even be eaten alone in cars. Refrigeration has also enabled a globalization of taste. For example, sushi can be bought all over the world—even in places thousands of miles from a source of fresh fish.



Source: Library of Congress

CONSTRAINT: The chaos and violence of World War II brought with it widespread interruptions to food supplies as part of coordinated efforts to use hunger for military advantage. To manage this challenge, countries including the United Kingdom and United States imposed rationing systems to keep food prices in check, ensure equitable distribution of food supplies, and mitigate the threat of widespread starvation.

Alternative futures scenarios based on these directions of change—growth, constraint, collapse, and transformation—provide a useful framework for considering the future of the global food web and how finding, buying, and consuming food might evolve in the next decade.

2 | Four Futures of Food



In this section, you will find our Four Futures of Food scenarios, which depict self-contained worlds based on the alternative directions of change described in the Introduction. Set in 2021, these scenarios are not predictions; the real future will likely be shaped by elements from each of them. They are designed to provoke thought about possibilities and inspire you to devise resilient responses to the shocks and uncertainties of the future. Preparing for this broad spectrum of threats and opportunities means stepping back to imagine a variety of possible futures—and placing yourself in them.

Each of the Four Futures includes a vignette from “Dinnertime in 2021,” which paints a picture of what one American family’s food experiences might look like ten years from now. Today, in 2011, Lori Miller is a hardworking, 50-year-old, single mom in the greater Chicago area. She does her best to keep up with evolving food wisdom and make responsible food choices for herself and for her son Ethan, a junk food-loving 12-year-old. But in 2021, their lives will be very different.

The Millers are not meant to be representative of all American families. There are a plethora of American households each with their own idiosyncratic approaches to shopping and eating. However, we think these stories about a single family are a good way to get immersed in a potential future world.



Source: Flickr user stuckincustoms



GROWTH

Imagine in 2021:

Consumers can get practically anything they want, whenever they want, and without much concern for cost. In Minnesota, avocados are always "in season"—whether they're imported from California in July or from Argentina in January, they're still two for a dollar. In Algeria, food riots are a thing of the past. A diverse array of foreign-grown goods are hitting Algerian market shelves—and they're cheap enough for most of the citizenry.

All of this was made possible by major breakthroughs in energy technology in the early 2010s. Hydrogen-based fuels ensure clean power and allow us to continue using existing infrastructure. The steady climb of food costs that gripped the previous decade reversed and prices fell. New, more convenient foods keep busy young people fed, but keep them out of the kitchen. And safety is not an issue for the elderly, with meals that self-heat when removed from the package. Others, though, choose to pull back from these strong global flows. They see the abundance of fresh, frequently local produce as a call to simplify.

Not everyone, however, has access to this abundance. Even as more countries plug in to a booming commercial food infrastructure, rural poverty and urban inequality keep the number of hungry people inching upward. And while the wealthier residents of countries all over the world have more choices, they have more problems, too. Consumers find themselves awash in divergent branding messages coming at them from all angles. Gimmicky packages and in-store interfaces compete for attention in the supermarket, and advertisers have mastered pushing products to people on their smart phones.

Access to all this decadent food also means more people suffer from heart disease and diabetes. Back in 2005, diet-related health risks were as big a problem as HIV/AIDS and tuberculosis combined. In 2021, they dwarf communicable diseases twofold. Now that people can get the tastes they want quickly and cheaply, they expect getting healthy to be just as easy and instant. Diet fads pop up and fade at a dizzying rate, promising to simplify choices and create health with a magic bullet.

The food and biotechnology industries thrive in the growing marketplace. Hybrid crops that do well in arid climates take hold where global warming is hitting the hardest, and they ensure a constant supply of staple foods. But while vertical farms and energy-intensive fixes to water supplies take some pressure off the land, intractable problems of waste management, lost carbon uptake, and peak phosphorous still loom in the future.



What's Going On?

This future is shaped by many of the trends we see today. In it, the emergence of abundant energy technologies allows us to desalinate ocean water into drinking water and integrate open-air "vertical farms" into city skyscrapers—making it possible for our complex food system to withstand shocks and keep growing. Hypermarkets and big-box retailers expand through the mid-2010s, opening more and more locations around the world. Such megastores become the places people go for processed and fresh food, and demand for high status and cosmopolitan goods grows across the developing world.

Agricultural science and supply chain management have also advanced. However, progress focuses almost exclusively on key commodity crops like rice, soy, and corn, which fight hunger and provide ingredients for processed foods. In the meantime, ecosystems strain to keep up with demand. And while governments and corporations have instituted sustainability standards, their credibility and effectiveness become increasingly suspect.

Put Yourself in This Future:

This is a future in which the energy crisis has been averted, creating solutions for water and food insecurity problems. While your work may remain very similar in this future, consider the dilemmas that have not been fully resolved, like the adverse health impacts of urbanization and dietary transitions, or the long-term sustainability of continuously increasing production.



DINNERTIME IN 2021

"You aren't serious, are you, Mom?" Ethan said, giving his mom the skeptical look he had mastered over the years.

"I am!" replied Lori. "They say that the Brazilian Rain Forest Diet is great for your health and your skin. I've already ordered the first set of meals."

Ethan sighed. His mother was no stranger to the commercial diet scene. She would try anything from a mail-order or specialty store—as long as it saved her from the temptations of the supermarket. First there was the Beach Front Diet. Then there was Doktor NoKarb. Then there was VitaSysSystem, with the pre-packed meals that reminded Ethan of astronaut food and army rations.

"They say it's sustainable, Ethan," his mom explained.

Ethan shook his head. "It's just another fad, Mom," he groaned. "You can eat healthily without importing food all the way from the rainforest—that's not sustainable!"

"Acai berries have been proven to—," Lori began, but Ethan tuned her out. Once Mom got on board a new diet train, there was no getting her off it until the next big thing came along.



Source: Flickr user nncapa



CONSTRAINT

Imagine in 2021:

Thanks to a food poisoning outbreak in 2012, decades of relying on global supply chains reversed themselves almost overnight. Cattle started dying off in droves and by the time the cause of the disease had been traced, one in five industrial meat producers had slaughtered their animals. Consumer confidence in the safety of internationally traded food and meat was destroyed.

The rallying cry all over the world became “Know your farmer. Eat local. Eat plants.” At first, buying local was easier said than done. Farms that had optimized their land for animal feed found themselves with little demand for commodity corn. So in cities all over the world, people began repurposing rooftops and open spaces for urban farming. Still, not nearly enough food could be produced to meet demand. This period of transition was neither quick nor painless—trade of everything from commodity crops to packaged foods plummeting and dramatic spikes in hunger causing food riots worldwide.

Although it has taken a few years, the situation has now stabilized. Advances in urban farming and agriculture now supply large percentages of food to urban residents worldwide, and these efforts have made access to basic foods more reliable all over the world. Farmers markets and community-supported agriculture proliferate and have become regional; they are the predominant way that many people buy their food.

Legal efforts, ranging from international treaties to municipal laws, place limits on food choices and trade. In many places, people pay huge taxes for eating too much food, or for eating food that requires too many resources to produce or ship. Global hunger and obesity rates are both down from 2011 levels, thanks, in large part, to fewer opportunities to indulge.



What's Going On?

The global food web faces a number of potential major blows in the coming decade. Water shortages, oil scarcity, or, as in this scenario, the unexpected outbreak of zoonotic disease, could easily send the food web into chaos. In response, political actors of all sizes engage in the often-contentious process of designing regulations and agreements to curb the effects of disruptions on the supply chain.

Hunger and fear of food-borne illnesses lead to fundamental shifts in what people value in their food choices—and how the market goes about supplying food. Worldwide, fear drives reductions in the food trade, but “local” comes to mean “safe and high quality,” and food producers reorient to meet these demands. Supermarkets, big box retailers, and non-chain restaurants remain viable, but they change to accommodate consumers who want seasonal fruits and vegetables. Foods that appear artificial—such as packaged foods—experience precipitous declines.

While the disruptions in this scenario were challenging, they laid the groundwork for better regulations and more resilient infrastructure that prevent future collapses.

Put Yourself in This Future:

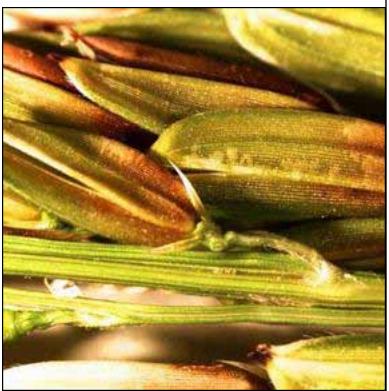
This is a scenario in which constraints to the food web result in reaction to larger, systemic problems. Remember, though, that it is plausible that these values and regulatory controls could emerge independent of any major disruption—at least in certain regions. As you consider this future, think about how your work would evolve in the context of a shift from global toward regional-based food systems.



DINNERTIME IN 2021

Ethan parked his bike in front of the market, out of breath, but on time. He met up with his friends in front of the still-closed doors, and they circulated clipboards for their orders and waited. Joining this “Purchasing Collective Group” had been a great idea, Ethan thought. Having a dozen or so households place group orders on groceries helped keep individual costs down, which was important to Ethan’s student budget. He had to show up on “Order Day” to place orders and he had to get there on time or risk losing his place to another applicant. But it was worth it.

Today, Ethan felt particularly good about having joined. His Group had earned “Zero Food Waste” certificates six weeks in a row, so they were entitled to a luxury order. For Ethan, that meant 4 ounces of beef—a real treat he planned to use for a romantic dinner with his girlfriend.



Source: U.S. Forest Service



COLLAPSE

Imagine in 2021:

Most affluent, privileged kids have never tasted a peach. However, this is a rather minor tragedy, considering that the United Nations announced that 2.5 billion people are living in hunger worldwide. Worsening climate conditions, they cautioned, could increase that number by 2030, leaving nearly half of the world's 8 billion people without a secure source of food. The pockets of land that escaped the worst problems of the decade are like fortresses, their residents few and insulated. But even in these places, as in the rest of the world, nutritional deficiencies and diseases like scurvy and rickets have resurged.

Experts had warned about the dire consequences of collapsing pollinator bee populations for years. But when already decimated bee populations dropped in 2013, those consequences became real. Worse yet, the maladies that had plagued North America and Northern Europe spread to China and Eastern Europe. Production of some of the most nourishing foods—scores of varieties of vegetables, fruit, nuts, and legumes—ground nearly to a halt. Those that remained skyrocketed in price. This devastated economies around the world that were still slowly recovering from the Great Recession of the 2000s.

In 2011, 2014, and 2018, there were surges of scarcity in the most basic cereals. Corn blights, wheat rusts, and rice-killing floods were compounded by ever-more expensive energy costs, making it even harder for food to get from the few places where it was thriving at any given time to everywhere else.

High-protein miracle foods developed in the '00s to combat hunger in the direst circumstances have become staples nearly everywhere. Many countries around the world have added direct rationing to their coping strategies, but food choices are reduced across the board. Supermarkets, skating on increasingly thin ice with their complex supply chains, fail. Major food manufacturers have already gone under as their key ingredients became more and more unreliable, but those that remain scrape by with comforting brands that try to make what foods remain approximate what we had before. New varieties of vegetables emerge, but are still scarce. And while the developed world still produces meat, it's a pricey delicacy.



What's Going On?

While all of the scenarios in this briefing assume a certain amount of environmental instability, in this scenario, a widespread refusal to prepare for and adapt to environmental problems has led to persistent stresses on land and water resources. Cereals that form the cornerstone of national food security strategies, animal feed, and processed foods become very expensive and are hoarded by nations, companies, and individuals. A third of all the crops grown in North America and Europe are severely compromised and then obliterated. And an extended fuel crisis makes it increasingly hard even for people with resources to cope by having foods shipped to them from elsewhere.

As dire as this scenario sounds with respect to food itself, this hungry decade also causes political crises and violence. The negotiations between foreign investors and sovereign nations over agricultural lands fail as the speculative bubble on farmland bursts, compounding scarcity and political and financial crises. Major parts of the global food distribution and retail infrastructure breakdown, which adds to the everyday experience of chaos that makes up this future.

Put Yourself in This Future:

This scenario is based on the convergence of real environmental threats and their systemic consequences. This future is bleak, but as you imagine yourself in it, remember that there are winners and losers in every future. More diversified and distributed businesses have a better chance, and in this protracted crisis there would be a serious demand for comfort and familiarity. Think about what decisions could hasten this vision of collapse, or avert it. Think about what you would do to help bring stability, recovery, and sustenance into this future.



DINNERTIME IN 2021

Lori surveyed the pharmacy shelves with a practiced eye, turning the supplement bottles to scrutinize their content labels. Another strain of wheat rust had sent prices skyrocketing again, so Betty C's NuOat Bars would once again make up the bulk of her dinner tonight. Supplements were affordable and, with a son in college, she didn't have the money for fruits and vegetables—or the nerve to brave the security cordons and guards at the grocery store.

She needed to pick the best array of supplements to ensure that she got comprehensive nutrition. The oat and microalgae derivatives that were the most affordable tasted okay, but the new generation of dietary supplements helped to offset the lack of fresh produce. Lori placed a bottle in her basket and continued down the aisle.



TRANSFORMATION

Imagine in 2021:

Lab grown, in-vitro meat has been approved for sale in the United States and parts of Asia and Latin America since the mid-2010s. In response, many of the commodity crops that had been used in meat production have been repurposed for more direct human consumption. The shift has slowed down the environmental costs of food production and has dramatically lowered hunger—but that's just one of the factors disrupting global food trade.



Source: Cornucopia Project/MIT Media Lab

3-D food printers, which layer food and flavors in precise ways, have been commercialized for home use and are in one in ten kitchens in the developed world. In Africa and Latin America, community groups have begun investing in shared food printers. As a result, entrepreneurs all over the world have established businesses that sell downloadable recipes that work with 3-D printers for everything from snacks to entire meals. Known as Food Gurus, these home tinkerers have remade food consumption in the same way that social media and bloggers transformed the media landscape in the 2000s. The frequency with which people eat out at restaurants has plummeted and so have sales of most packaged foods and drinks—although food companies were quick to put out downloadable recipes of their own.

Of course, not everyone likes all this new food technology. Home cooking—using traditional stovetops and ovens—has resurged among groups of people who see all of this technology as an assault on authentic food. And a sizable minority of consumers refuses to eat lab-grown meat, despite its lower cost, better safety, and low carbon footprint. To encourage traditional food preparation, an international group calling themselves Authentic Eaters has launched a new “Made By Humans” program. “We grow and eat food like people have for thousands of years,” their website says. “Our imperfections are our humanity.”

What's Going On?

In this future, food and cooking technologies that are being developed today are realized and become widely adopted, giving people an unprecedented ability to customize their food and create sophisticated dishes at home. While these technologies radically improve virtually every aspect of the food web—from lightening agriculture loads to dramatically simplifying home cooking—they have impacts beyond just improving efficiency and supplies. Cooking becomes an unnecessary task—even for producing healthy, fresh, and tasty food. As a result, traditionally made foods take on new meaning and become increasingly powerful signs of social affection. The bigger shift is away from billion-dollar brands toward a world in which foods can be customized to meet an individual’s taste and nutritional preferences. Individuals and entrepreneurs trade and sell easily reproduced recipes, leading to a greater remixing of global taste while much of the global food trade wanes.

Access points for food remain relatively similar in the developed world. The broader impact is in the developing world, where food is more easily attained—and where collaborative efforts to share food technologies, as part of development efforts to enable other types of labor—lead to community kitchens and other commons-based points for food consumption.

Put Yourself in This Future:

In this scenario, science and technology breakthroughs challenge today’s business and intellectual property landscape, with peer-to-peer exchanged recipes, prepared easily through food printers, replacing many commercially packaged foods. As you consider this future, think about how you can excel in a world of millions of new competitors. What can you do in the next decade to maintain your advantages?



DINNERTIME IN 2021

“I don’t know why you drag me to this every time I visit,” Ethan muttered, taking a moment to scan the crowd at the weekly farmer’s market near his mother’s suburban home.

“Because,” Lori replied, “you’re going to graduate soon and you need to know how to pick good produce! A family dinner is the perfect chance for you to work on those cooking skills—you can’t print real food with those fancy machines.”

Ethan smirked, but listened patiently while his mom showed him how to examine each morsel in the bins for freshness. They left the farmer’s market with cloth bags bulging with fresh produce—but Ethan made sure to stop by the local flavor-hacker’s booth to pick up some new taste recipes for the food printer in his dorm room.



The Four Futures of Food scenarios contained in this briefing are designed to help you start preparing for the changes we will see in the global food web in the coming years. Thinking about how to navigate the elements of these possible directions of change is critical to developing a more comprehensive and resilient approach to long-term strategic planning. The steps below provide some guidance for identifying strategies to adapt to these radically different, but plausible, futures.

STEP ONE:

Approach each scenario with an open mind.

- » **Read each scenario and make a list of the sorts of threats and opportunities this future will create for your organization.**
 - » **Answer the following questions about how consumers might adapt to each future scenario:** Where are they buying food? What are they eating? What has changed about how they acquire, prepare, and eat food? What aspects of consumer behavior are similar to today? What consumer behaviors or practices are different?

STEP TWO

Identify common themes that matter

- » Look over the entire report and your notes on the threats and opportunities presented by each future. **Write down the common themes** that emerge and take note of ones with strong implications for your organization.
 - » **Scan the emerging consumer behaviors you identified** in Step One. Compare these with the Four Futures of Food and make a note of the new behaviors that these futures share.

STEP THREE:

Create your preferred future.

- » Get together with others in your organization who have completed the first two steps. **Brainstorm responses to the threats and opportunities** these scenarios present for your organization.
 - » **Identify concrete responses to emerging consumer behaviors.** Brainstorm ways for your organization to improve some aspect of each: the way consumers acquire food, the way consumers prepare food, and the way consumers eat food. Think about the elements that may be within your control, such as formulation, packaging, or retail signage.

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This alternative scenarios briefing is part of IFTF's Global Food

Outlook Program. Previously, we published *Food Web 2020*, a map and companion report that identified the forces reshaping the food web and forecast key shifts in direction. We shared examples of innovative responses and presented principles for long-term business decision-making that will confer competitive advantage while increasing the resilience of the food web by 2020.

We hope you will use this briefing as a starting point for creating responses to the ever-changing global food web. In the coming months, we will continue to develop the scenarios and identify deeper insight into some of the forces that will shape these futures. We will identify region-specific forecasts around emerging consumer behaviors and decisions related to food, and offer you additional tools for thinking about them.

For more information about *Food Web 2020* or the Global Food Outlook Program, please contact **Dawn Alva** at dalva@iftf.org.