Sustainable Development and Food Security

Jumpstarting a move toward healthier, more equitable, and more environmentally friendly communities by focusing on the way local governments regulate development and how that impacts the food system

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This article first appeared as the introduction to *Remarkable Cities and the Security and Sovereignty of Food and Nutrition*, by Jonathan Rosenbloom (ELI Press 2023).

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DEVELOPMENT is not sustainable if it fails to create and support food and nutrition secure and self-supporting neighborhoods. Development impacts many aspects of the food system, including where food is grown, how far food must travel before it is consumed, where distributors and retailers of food are placed, and who has access to fresh and nutritious food. By viewing development and its associated impacts through a sustainability and lifecycle lens, we can rethink the role of development and how communities can grow while fostering a strong, inclusive, affordable, accessible, and healthy food system. Instead of being a force that exacerbates inequalities in access to nutritious food, increases greenhouse gas emissions, and damages wildlife habitats, development can be reconceptualized as a positive force to help regenerate and expand a local sustainable food system.

This book aims to do just that. It seeks to jumpstart a move toward healthier, more equitable, and more environmentally friendly communities. It does so by focusing on the way local governments regulate development and how that impacts the food system. While the food system is heavily affected by many international, national, and state policies, local laws regulating development have a significant impact on the food system. And yet, they remain some of the least explored laws. This book looks to begin that exploration by making 41 recommendations to amend development codes to increase food and nutrition security and sovereignty and create healthier communities. For each recommendation, it describes several local governments' ordinances that have adopted the action.

Food and nutrition security and sovereignty are essential parts of making communities more equitable. "Food and nutrition security" has been defined in a variety of ways, including existing "when all people at all times have physical, social and economic access to food, which is consumed in sufficient quantity and quality to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services and care, allowing for a healthy and active life."[1] An individual is considered to be food secure when she does not live in either hunger or fear of hunger.[2]

The U.S. Food Sovereignty Alliance defines "food sovereignty" as "the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations."[3]

The Alliance also notes six principles central to food sovereignty: First, a system that provides food for the people—food sovereignty puts the right to sufficient, healthy, and culturally appropriate food for all at the center of food, agriculture, livestock and fisheries policies. It is a system that values food providers—food sovereignty values all those who grow, harvest and process food, including women, family farmers, herders, fisherpeople, forest dwellers, indigenous peoples, and agricultural, migrant and fisheries workers. It is a system that localizes food systems and, relatedly puts control locally. Finally, food sovereignty means a system that builds knowledge and skills and works with nature

As many communities will experience development, growth, and/or changes in the next couple of decades, revising development codes to increase food and nutrition security and sovereignty is particularly important. By some estimates, the U.S. population is projected to increase by almost 70 million people by 2040.[4] While some jurisdictions may experience a decrease in population, the overall increase in U.S. population and the phasing out of older buildings will require massive amounts of development, including approximately 100 billion additional square feet of commercial, retail, and industrial space.[5] In addition, it will require nearly one-half of all residential housing to be new—about 60 million new residential units.[6] Further, studies have suggested that 1 in 12 Americans in the southern half of the country will move toward California, the Mountain West, or the Northwest over the next 45 years because of climate influences alone.[7]

If development patterns for the next 20-30 years replicate development patterns for the last 20-30 years, accommodating these changes and growth will result in the loss of 40 million undeveloped acres in the United States (approximately the size of Oklahoma) and significant losses of agricultural land and critical habitats.[8] In addition, development built according to existing zoning codes will continue or exacerbate race- and class-based inequi-

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ties, vulnerabilities to climate-changing conditions, and loss of biodiversity, ecosystems, and natural resources. Some of the critical ecosystems and associated services lost through development include purifying water, pollinating food, mitigating flood, controlling disease, and maintaining a resilient nutrient cycle.[9]

Most relevant here, developing pursuant to existing codes fails to adequately build food and nutrition secure communities and address past discriminatory practices concerning the food system and development. The current regulation of development contributes to many challenges, including hunger, malnutrition, obesity, food insecurity, physical and psychological health impacts, environmental impacts, and economic impacts. In addition, some of these challenges more heavily burden Black, Indigenous, and People of Color (BIPOC) and exacerbate systematic inequities.

As greenfields and farmlands are lost to accommodate growth,[10] it is more important than ever that we rethink the way we regulate development. The United States lost more than 31 million acres of farmland to development from 1992 to 2012.[11] This included almost 11 million acres of land where food can be grown with the least environmental impact.[12] Today, almost 2,000 acres of agricultural land are converted every day to other uses.[13]

Not only must we slow the rate of conversion, but we also need to think about regenerating the food system in urban, suburban, and rural areas. Development code amendments should go beyond doing "no additional harm." They should seek to remedy past inequalities and bring back many of the lost ecosystems that are part of a robust food and agriculture system. If lost beneficial aspects of the food system are not regenerated and continue to develop under existing codes, it will exacerbate the strain on an already vulnerable food system.

Nationwide, there is evidence of positive changes happening at the local level in the regulation of development. The 41 recommendations in this book seek to compile those changes to help facilitate local action to increase food and nutrition security and sovereignty. These recommendations are presented as options for the 39,000 U.S. local governments. Obviously, not all recommendations are relevant to all jurisdictions. Important for food and nutrition security and sovereignty, the decision to adopt a recommendation should be a community, bottom-up one.

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Below, we describe and summarize some of the common impacts development has on the food system to provide context for the recommendations in the rest of the book. Each recommendation includes a more specific analysis of how that recommendation will affect social equity, economic vitality, and environmental protection and regeneration.

Social Impact on the Food System

In this subpart, we explore some of the ways development affects the food system and how those, in turn, translate into societal harms.

Health Impacts and Food Swamps. A food swamp is an area "in which large numbers of unhealthy energy-dense food offerings inundate or 'swamp out' the relatively few existing healthy food offerings."[14] In *Adults With Diabetes Residing in "Food Swamps" Have Higher Hospitalization Rates*, Aryn Phillips and Hector Rodriguez found that food swamps are associated with higher hospitalization rates among adults with diabetes.[15] The presence of a food swamp has been found to be a stronger predictor of higher obesity rates.[16]

Getting the proper nutrition in food swamps is particularly challenging. Nearly one-third of the U.S. population over nine years old is at risk of anemia or deficiency in at least one vitamin.[17] Anemia is a condition in which an individual lacks enough healthy red blood cells to carry adequate oxygen to the body tissues and is often caused by a shortage of iron in the body.[18] Thirty-one percent of the U.S. population is at risk of at least one vitamin deficiency or anemia.[19]

Food swamps disproportionately impact BIPOC and people with low incomes and wealth. Studies have shown that Black residents are more likely to reside in food challenged areas, increasing their risk of a poor diet and diet-related health challenges.[20] In addition, 37% of women, 55% of non-Hispanic Black individuals, 40% of individuals from low-income households, 42% of individuals without a high school diploma, 42% of underweight individuals, and 39% of obese individuals are at risk of deficiency or anemia.[21] People wrestling with obesity also have higher than average rates of micronutrient deficiencies.[22] Studies suggest that deficiencies of specific vitamins and minerals (that play important roles in glucose metabolism and insulin-signaling pathways) may contribute to the development of diabetes in the obese population.[23]

By manipulating permissible uses and incentivizing other uses, development codes play a role in creating and maintaining food swamps. In *Disentangling Neighborhood Contextual Associations With Child Body Mass Index, Diet, and Physical Activity:*

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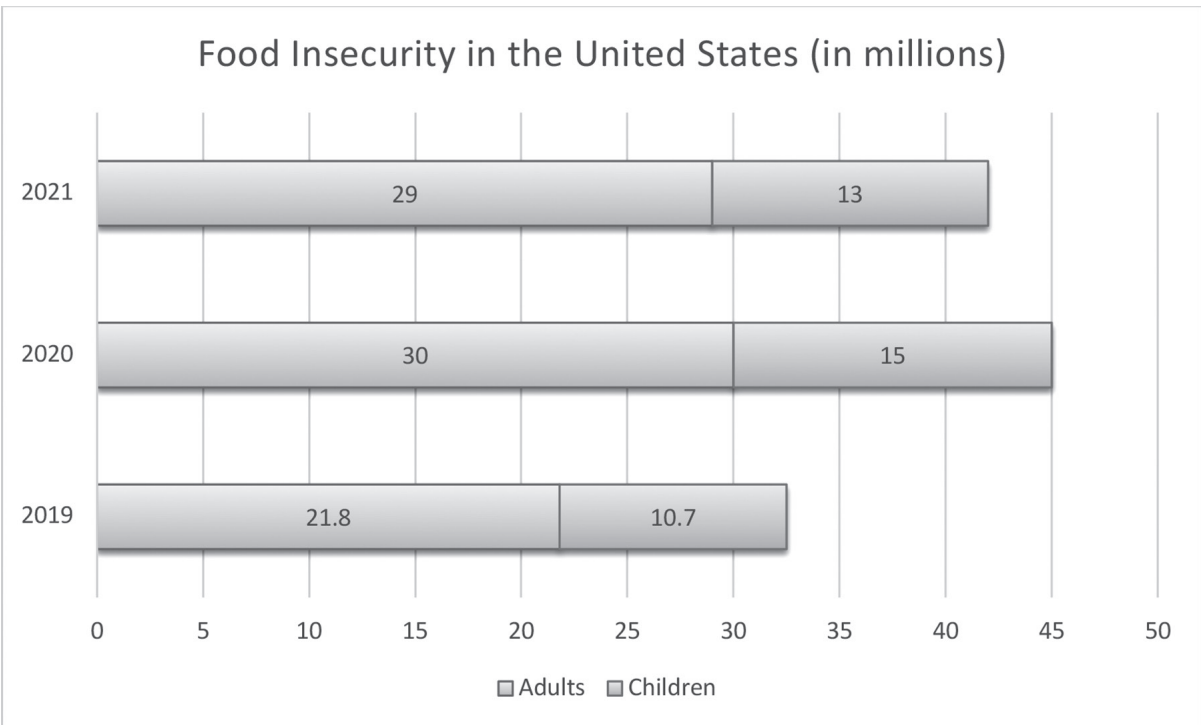
The Role of Built, Socioeconomic, and Social Environments, Amy Carroll-Scott et al. discovered that neighborhood environments are an important factor in preventing childhood obesity and its adverse consequences.[24] Neighborhood-built environments, such as access to fast food versus grocery stores or parks versus no parks, were associated with body mass index (BMI) and health behaviors.[25] Higher levels of property crimes and living further from a grocery store were also associated with a higher BMI. Conversely, access to parks, playgrounds, and gyms was associated with more frequent healthy eating and exercise.[26]

Local food environments may also play a role in reducing overweight and obese populations. The prevalence of obese and overweight individuals was lowest in areas that had only supermarkets. Areas that had a combination of supermarkets and grocery stores also had low obesity rates.[27] The prevalence of obese and overweight individuals was the highest in areas with grocery stores and convenience stores only.[28] Further, students living within a five-minute walk of a fast food outlet were found to have higher BMIs, and those living in areas with a higher density of fast food outlets reported less frequent healthy eating and more frequent unhealthy eating.[29] Some studies have also found that areas with primarily Black residents tend to have fewer supermarkets than wealthier neighborhoods with predominantly White residents.[30] However, other studies have found no correlation.[31]

Despite the health and other challenges presented by food swamps, through modifications in local development laws, there is potential for change. Various recommendations in this book seek to address health impacts stemming from the regulation of development, including Grocery Store Development in Recognized Food Deserts (page 161 in the book), Farmers Markets in a Variety of Districts (page 83), Limit the Density of Dollar and Small Box Discount Stores in Food Deserts and Food Swamps (page 234), among others.

Food Insecurity and Food Deserts. Deeply connected to health impacts and food swamps is food insecurity and food deserts.[32] In 2020, 14.8% of households with children were food insecure.[33] In 2020, 10.5% of U.S. households were food insecure, including 35.3% of households with incomes below the federal poverty line. In addition, 3.9% of households (or 5.1 million households) experiencing very low food security.[34] "Very low food security" occurs when "food intake of household members is reduced and their normal eating patterns are disrupted because the household lacks money and other resources for food."[35] Some characteristics of very low food secure households include a concern that there is not sufficient money



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to buy any food or nutritious food, adults are reducing or skipping meals because of a lack of money at least a few times a year, and a loss of weight due to lack of money to buy food.

The COVID-19 pandemic exacerbated food insecurity. Feeding America estimates that 42 million people (1 in 8), including 13 million children (1 in 6), may have experienced food insecurity in 2021.[36] Many people who have been most impacted by the pandemic were food insecure or at risk of food insecurity before COVID-19 and are facing greater hardship since the pandemic began.[37] The chart below shows the number of food-insecure Americans in 2019, 2020, and 2021.

From October 1, 2017, to September 30, 2018, children accounted for 44% of all Supplemental Nutrition Assistance Program (SNAP) participants.[38] SNAP provides nutrition benefits to supplement the food budget of needy families.[39] The majority of the 50 million food-insecure people living in the United States are Black, Latino, or Native American.[40] For this reason and others, some refer to food deserts as food apartheid to express the intentional nature of land use laws designed to discriminate.

Lack of access to healthy food does not solely arise from a lack of financial access. Food insecurity is frequently found in low-income areas where the population lacks easy access to fresh fruit, vegetables, and other whole foods, often because of a lack of easy access to supermarkets. In 2010, the U.S. Department of Agriculture reported that 18 million Americans live more than a mile from a supermarket in urban/suburban areas and more than 10 miles from a supermarket in rural areas.[41]

Food insecurity can greatly impact health. People living in areas with the lowest availability of healthy food are 55% less likely to have a good quality diet than people living in areas with greater availability.[42] People living in neighborhoods with greater access to healthy food are also 45% less likely to develop diabetes over five years.[43]

Food-insecure households tend to be located slightly farther from large food retailers and slightly closer to convenience stores than food-secure households.[44] Furthermore, food-insecure households report traveling slightly farther to their primary food retailer, increasing costs.[45]

Food-insecure areas also tend to have higher rates of abandoned or vacant homes and residents who have lower levels of education, lower incomes, and higher unemployment.[46] Census tracts with higher poverty rates are more likely to be in food deserts than otherwise similar low-income census tracts in rural and in very dense (highly populated) urban areas.[47] For less dense urban areas, census tracts with higher concentrations of non-White populations are more likely to be in food deserts, while tracts with substantial increases in White populations between 1990 and 2000 were less likely to be identified as food deserts in 2000.[48]

While hunger and food insecurity are major challenges, changes in local development codes can make an impact. This book aims to provide local governments with a variety of options to amend development codes that best suit their needs to address food insecurity. Various recommendations in this book address these challenges and include Grocery Store Development in Recognized Food Deserts (page 161), Farmers Markets in a Variety of Districts (page 83), and Permit the Display and Sale of Fruits and Vegetables on Public Sidewalks (page 109), among others.

Economic Impact on the Food System

In addition to social impacts, the impacts development has on the food system can affect the economy in several ways. Healthcare costs, the distance food travels, the direct cost of food, and food waste are parts of the food and agriculture system that have a significant impact on the economy. Smart development code changes can help reduce these costs while improving the food system. Below, we explore some of these costs.

Healthcare Costs. Americans are getting sick because of, among other things, contaminants in the water, soil, and air.[49] The location and use of various food and agricultural activities can have significant impacts on human health. As discussed above, food swamps, deserts, and insecurity impact health. These impacts have a real cost on the health system and on individual's health care.

In addition, other uses such as concentrated animal feeding operations (CAFOs) can create favorable environments for pathogens to spread and mutate that impact human health.[50] CAFOs frequently use low doses of antibiotics for extended periods, leading to antibiotic-resistant bacteria.[51] These antibiotic-resistant bacteria are transmitted to humans through water, fertilizer use, dust, and consumption of meat.[52] Each year more than 2 million Americans become ill with antibiotic-resistant infections, and more than 23,000 people die.[53] In addition to the tragic emotional and psychological impact, this has significant impacts on the cost of healthcare. In the United States, antibiotic-resistant

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infections cause health costs of $20 to $34 billion annually.[54]

Food Transportation Costs. The term "food miles" refers to the total geographic distance food is transported along its journey from cultivation to processing to distribution and to the consumer at the point of sale. Processed food in the United States travels over 1,300 miles before it reaches the table and fresh produce travels over 1,500 miles before being consumed.[55] This long-distance transportation of food consumes large quantities of fossil fuels. It is estimated that we currently put almost 10 kilocalories of fossil fuel energy into our food system for every 1 kilocalorie of energy we get as food.[56] The distance food travels adds a direct cost as well as an ecosystem cost associated with greenhouse gas emissions and other environmental impacts.

During peak times when crops are in season and available, local food purchased at farmers markers can be less expensive than imported food purchased at a supermarket.[57] Shorter transportation distances and lower packaging costs partially explain why farmers market prices can be lower than supermarket prices.[58] However, despite similar costs, local food can create equity issues as not everyone has access to farmers markets or time to shop there.[59] Farmers markets are not open as frequently as supermarkets that may be open 24 hours, creating difficulty for those whose work schedules that prevent them from shopping during farmers market hours.

Some farmers markets have attempted to broaden their consumer base by providing "Double Up Food Bucks," which match fruit and vegetable purchases for SNAP participants up to $20 per day.[60] Federal initiatives, such as "Know Your Farmer, Know Your Food," and federal funding that supports farm to school programs and investments in local infrastructure, such as food hubs, are helping to expand local food systems.[61]

There are also positive signs that local governments are taking advantage of the benefits stemming from farmers markets. Farmers markets grew by 76% from 2008 to 2014.[62] Farmers markets can help support healthy communities by lowering BMIs, educating shoppers, improving diets, and creating healthy social connections.[63] As discussed in the recommendations, development codes can support this effort by permitting and encouraging farmers markets and local fruit and vegetable sales in more zoning districts.

Food Waste Costs. It takes 780 million pounds of pesticides, 4.2 trillion gallons of water, 30 million acres of cropland, and nearly 2 billion pounds of fertilizer to grow the food that is *wasted* in the United States each year.[64] It is estimated that between 30% and 40% of food is wasted.[65] The average person in the United States wastes about a pound of food per day,[66] 50% more than in 1970.[67] Approximately 38% of grain products, 50% of seafood, 52% of fruits and vegetables, 22% of meat, and 20% of milk are lost.[68] The average American consumer spends approximately $1,300 each year on food that ends up being wasted.[69]

Food waste costs the world $2.6 trillion each year.[70] If food does not meet strict aesthetic standards, it is often discarded and frequently left in the field to rot.[71] Even when aesthetically pleasing, it can be cheaper for farmers to leave produce in the field rather than sell or donate it due to the labor costs of harvesting.[72] When the retail prices of produce are too low, farmers cannot cover their costs, make a profit, or stay in business.[73] Boxes for toting produce can cost $1 each while picking and packing can add $4.50 per box.[74] With additional costs in transportation and storage and fluctuating crop prices, farmers, at times, simply cannot afford to harvest the crops, especially ones that are unlikely to sell because of aesthetic reasons.[75]

Additionally, supermarkets may throw out food that is nearing its sell-by date, believing it is a health and safety issue or believing they cannot sell the product.[76] There is a common misconception that donating these foods will result in lawsuits.[77] However, at least one report stated that there has not been a single case that involved food donation-related liability.[78] If food is donated to a charity, the donor may be protected from liability under the Bill Emerson Good Samaritan Food Donation Act, which protects the donor from being sued if the donation is made in good faith.[79]

Food waste is the number one material in American landfills, accounting for 24.1% of all municipal solid waste according to the U.S. Environmental Protection Agency, leading to significant greenhouse gas emissions.[80] Decomposing food waste in landfills contributes 16% of U.S. methane emissions.[81] As discussed below in the "Consumption" section, different foods have different amounts of greenhouse gas emissions associated with their production.

While food waste is a large and multifaceted issue, various recommendations in this book try to address it from the development code perspective. For example, the recommendation Composting in

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Agricultural, Residential, and Commercial Districts (page 54) provides a way to divert food waste from landfills, as does Equipment and Composting as Accessory and Temporary Uses (page 77).

Environmental Impact on Food System

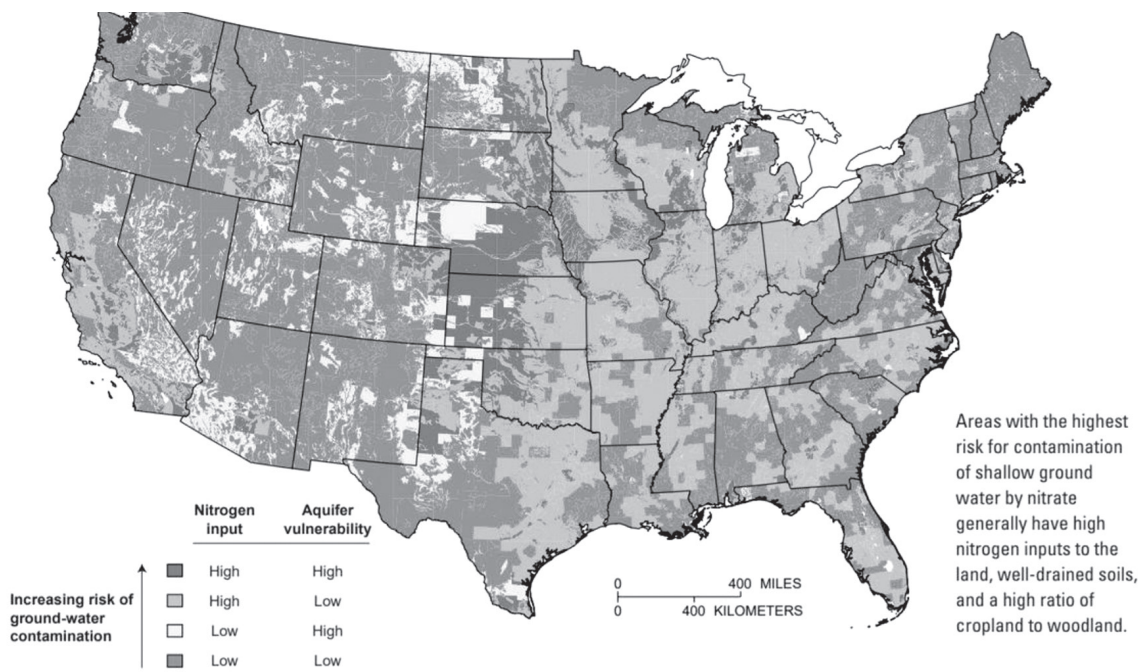
The impacts the food system has on the environment cannot be understated. Almost all phases of a food product's life cycle impact some aspect of the environment. Food systems heavily depend on natural resources, including land, soil, water, biodiversity, minerals for crops and animals, and fossil fuels.[82] Food systems can be a huge driver of environmental impacts, and therefore managing how development affects the food system can help address critical environmental issues, such as loss of biodiversity, soil degradation, water depletion, and greenhouse gas emissions.

Production. During the production of food, the United States loses almost two billion tons of topsoil per year.[83] In 2015, a U.N. Food and Agriculture Organization report determined that global topsoil will be gone in only 60 more harvests.[84] In addition, 33% of the world's soil is moderately to highly degraded due to erosion, nutrient depletion, acidification, salinization, compaction, and chemical pollution.[85]

It is estimated that the yearly cost of erosion from agriculture in the United States is $44 billion per year.[86] This erosion has reduced yields, with a reduction in the Midwest by 20%-40% for row crops.[87] Soil compaction due to mechanized agriculture and development is also an issue, with losses due to land compaction in the United States costing an estimated $1.2 billion per year.[88]

In his paper published in 2000, Steven Shrybman argued that "the globalization of agricultural systems over recent decades is likely to be one of the most important causes of overall increases in greenhouse gas emissions."[89] Over 10% of all greenhouse gas emissions in the United States come from industrial agriculture, which releases 600 million tons of carbon dioxide equivalent into the air each year.[90] Production accounts for the majority of greenhouse gas emissions in agriculture, which mostly come from soil microbial processes and manure.[91] Fertilizer is a major source of nitrous oxide emissions, which escape from the soil into the atmosphere.[92] Fertilizer is also energy intensive to produce. It is estimated that fertilizer production is the second largest energy demand of agricultural production, but is typically excluded from calculations of the agriculture sector's energy demands.[93]

Animal waste is frequently used as fertilizer, but synthetic fertilizers have also become commonplace.[94] Chemical fertilizers and animal manure provide crops with the nitrogen and phosphorus



* U.S. GEOLOGICAL SURVEY, THE QUALITY OF OUR NATION'S WATERS—NUTRIENTS AND PESTICIDES (1999), https://pubs.usgs.gov/circ/circ1225/.

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they need to grow, but when these chemicals are not fully used by the growing plants or overapplied they can be lost from the farm and negatively impact air and water quality.[95] Nitrogen can be lost through the air from fields in the form of gaseous compounds such as ammonia and nitrogen oxides.[96] Ammonia can harm aquatic life if large amounts are transferred from the atmosphere to the surface waters, while nitrous oxide is a potent greenhouse gas.[97]

Excess nitrogen and phosphorus can also be washed away from fields by rain or snow, or leach through the soil and into groundwater over time.[98] When these seep into waterways, they can cause algae blooms that kill off fish and other aquatic species.[99] As shown in the map below, much of the United States is affected by shallow groundwater contamination by nitrate.[100] States report that 40% of the waters surveyed are too contaminated for basic uses such as fishing and swimming.[101] Relatively high nitrogen concentrations occur in streams and shallow groundwater in the Central Valley of California and parts of the Northwest, Great Plains, and Mid-Atlantic regions because natural characteristics favor the transport of nitrogen.[102]

In the United States, agriculture accounts for 80% to 90% of consumptive water use.[103] Several agricultural activities and CAFOs are exempt from the Clean Water Act (CWA), which results in much of agricultural production being exempted from the law.[104] Even though agriculture is a large source of pollution in rivers, streams, and wetlands, the exemptions from the CWA mean that water pollution regulations generally do not cover farms.[105] This leaves much of the regulation of these activities to states and local governments when not preempted by state laws.

Synthetic pesticides have led to increases in crop yields by protecting crops from some destructive pests.[106] However, widespread pesticide use increases negative environmental impacts. Pesticides and their breakdown products can be carried via the air drift during application, dust created by wind or tillage, surface runoff during irrigation or rainfall, sediment carried by runoff, leaching through the soil into groundwater, or volatilizing into the air and depositing onto surfaces.[107] In agricultural areas in the United States, pesticides were detected in 97% of sampled streams and 61% of sampled shallow groundwater areas.[108] Organochlorine, a pesticide compound that has largely been discontinued, has been detected in 92% of fish tissue samples.[109]

Pesticides applied to crops may have a significant adverse impact on pollinating insects.[110] The loss of pollinators affects wild plant populations as well as yields of crops such as fruits and nuts.[111] There has been a 75% decline over 30 years in flying insect biomass.[112] Insect pollinators such as bees contributed $29 billion to U.S. farm income in 2010.[113] The loss of these flying insects could be devastating for agriculture and the food system.

Additionally, 60% of global terrestrial biodiversity loss is related to food production.[114] In the United States, habitat loss and degradation are the leading causes of species decline.[115] Improper agricultural methods can elevate concentrations of nutrients, fecal bacteria, and sediment loads in waterways, damaging habitats.[116] Animal waste in water bodies can damage aquatic ecosystems and introduce bacteria that may threaten public health.[117]

According to the North American Bird Conservation Initiative, more than a third of North American birds are at risk of extinction without significant action.[118] It is estimated that a third of U.S. species of flora and fauna are at risk, with aquatic life being particularly vulnerable.[119] More than 500 U.S. species are already considered extinct or missing.[120]

Consumption. By some estimates, the U.S. population is expected to grow from 329 million people in 2020 to 404 million people by 2060.[121] The average American's daily calorie consumption increased from 2,054 in 1970 to 2,501 in 2010.[122] Between 1983 and 2000, food availability in the United States increased by 600 calories per person.[123] This increase was fueled by 100.6 million hectares of land and fishing area.[124]

Dietary choices affect environmental outcomes. The United States has the second-highest rate of meat consumption in the world, averaging 198.51 pounds of meat consumed per person, per year.[125] Beef creates 99.48 kilograms of carbon dioxide equivalents per kilogram of food produced.[126] Meanwhile, tofu production creates 3.16 kilograms of carbon dioxide equivalents per kilogram of food produced.[127] Consuming less meat can help reduce greenhouse gas emissions. Even simply shifting the type of meat consumed can make an impact. Red meat is around 150% more greenhouse gas intensive than chicken or fish.[128]

Transportation. Transportation of food accounts for about 11% of the greenhouse gas emissions from the food system.[129] While cities are the major centers of consumption in the United States, food is generally grown elsewhere and needs to be transported long distances to reach consumers. Food typically

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takes a long journey from the primary producer to process and packaging facilities, to regional and then local distribution centers, to retailers, and then to homes and other places people typically consume food.[130] Energy demands can vary greatly depending on the mode of transportation used.[131]

While the environmental impacts of our food system cannot be changed through modifications to local law and zoning codes alone, some changes can be made on a local level that will make a large impact. Various recommendations in this book address these issues, including Concentrated Animal Feeding Operation (CAFO) Regulations (page 202), Development Restrictions to Protect Prime Soils (page 223), and Protection of Pollinators From Habitat Loss and Chemical Exposure (page 246), among others.

Positive Changes and Model Communities

Many communities throughout the United States have implemented positive measures to help strengthen the food system while continuing to develop and grow. Each section throughout this book includes examples of such communities. These are local governments that have taken the bold step to implement policies to ensure that development occurs in a way that supports the local and national food system.

This book, like its companion *Remarkable Cities and the Fight Against Climate Change*,[132] describes concrete ways for communities to amend development codes and adapt to changes as they occur. The Sustainable Development Code aims to help all local governments, regardless of size and budget, build more resilient, environmentally conscious, economically secure, and socially equitable communities.

Each topic consists of three key sections: introduction, effects, and examples. The introduction explains the recommendation to amend the code. The effects section explains how adopting the recommendation may affect the community and code. Each recommendation then provides several examples of local governments that have adopted the recommendation. The goal is to explain each example in plain language. Each topic includes the examples of local governments that have adopted the recommendation, so you can see how these recommendations work in real life.

As public awareness grows about the problems facing us, we hope communities can find new and creative ways to solve challenges around the food system. Most of all, we hope the recommendations in this book inspire you and your community to take positive steps to change the way we develop. The dozens of local government examples throughout the book illustrate that change is possible. **ELI Press**

Endnotes

1. Marzella Wüstefeld, United Nations System Standing Committee on Nutrition, Presentation at Meeting of the Minds on Nutrition Impact of Food Systems: Food and Nutrition Security (Mar. 25-28, 2013), https://www.unscn.org/files/Annual_Sessions/UNSCN_Meetings_2013/Wustefeld_Final_MoM_FNS_concept.pdf; *see also* U.S. Agency for International Development, *Agriculture and Food Security,* https://www.usaid.gov/what-we-do/agriculture-and-food-security (last visited July 8, 2021) (defining "food security" as having, at all times, physical and economic access to sufficient food to meet dietary needs for a productive and healthy life).
2. U.S. Agency for International Development, *supra* note 1.
3. U.S. Food Sovereignty Alliance, *Food Sovereignty,* http://usfoodsovereigntyalliance.org/what-is-food-sovereignty/ (last visited Oct. 27, 2021) (quoting Declaration of Nyéléni, the first global forum on food sovereignty, Mali, 2007); *see also* Peter Rosset, *Food Sovereignty: Global Rallying Cry of Farmer Movements,* 9 Backgrounder 1 (2003) (explaining the importance and definition of food sovereignty).
4. Sandra L. Colby & Jennifer M. Ortman, U.S. Census Bureau, Projections of the Size and Composition of the U.S. Population: 2014 to 2060 (2015), https://www.census.gov/content/dam/Census/library/publications/2015/demo/p25-1143.pdf.
5. Jonathan Rosenbloom, *Outsourced Emissions: Why Local Governments Should Track and Measure Consumption-Based Greenhouse Gases,* 92 U. Colo. L. Rev. 451, 496 (2021) (citing Arthur Nelson, Planner's Estimating Guide: Projecting Land-Use and Facility Needs 1-2 (2018)); Jennifer M. Ortman & Christine E. Guarneri, U.S. Census Bureau, United States Population Projections: 2000 to 2050, at 16, tbl.1 (2009), https://www.census.gov/content/dam/Census/library/working-papers/2009/demo/us-pop-proj-2000-2050/analytical-document09.pdf.
6. Rosenbloom, *supra* note 5.
7. Qin Fan et al., *Climate Change, Migration, and Regional Economic Impacts in the United States,* 5 J. Ass'n Env't & Res. Economists 643 (2018), https://www.journals.uchicago.edu/doi/full/10.1086/697168.
8. *Id.*
9. Zinta Zommers et al., *Loss and Damage to Ecosystem Services* (UNU-EHS, Working Paper No. 2, 2014), https://i.unu.edu/media/ehs.unu.edu/news/3890/resilience_academy_wp2.pdf.
10. Adam Wernick, *US Lost 11 Million Acres of Farmland to Development in Past 2 Decades,* World (Aug. 7, 2020), https://www.pri.org/stories/2020-08-07/us-lost-11-million-acres-farmland-development-past-2-decades.
11. A. Ann Sorensen et al., American Farmland Trust, Farms Under Threat: The State of America's Farmland (2020), https://farmlandinfo.org/publications/farms-under-threat-the-state-of-americas-farmland/.
12. *Id.*
13. *Id.*
14. Donald Rose et al., Deserts in New Orleans? Illustrations of Urban Food Access and Implications for Policy (2009), http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.189.2333&rep=rep1&type=pdf.
15. Aryn Z. Phillips & Hector P. Rodriguez, *Adults With Diabetes Residing in "Food Swamps" Have Higher Hospitalization Rates,* 54 Health Serv. Rsch. 217 (2019), https://perma.cc/56H9-VENQ.
16. Kristen Cooksey-Stowers et al., *Food Swamps Predict Obesity Rates Better Than Food Deserts in the United States,* 14 Int'l J. Env't Rsch. & Pub. Health art. 1366 (2017), https://perma.cc/7NPR-RKJB.
17. Julia Bird et al., *Risk of Deficiency in Multiple Concurrent Micronutrients in Children and Adults in the United States,* 9 Nutrients 655 (2017), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5537775/.
18. Mayo Clinic, Anemia , https://www.mayoclinic.org/dis-

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eases-conditions/anemia/symptoms-causes/syc-20351360 (last visited July 8, 2021).

19. Bird et al., *supra* note 17.

20. Kelly Brooks, *Research Shows Food Deserts More Abundant in Minority Neighborhoods,* Johns Hopkins Mag. (Spring 2014), https://hub.jhu.edu/magazine/2014/spring/racial-food-deserts/; Bird et al., *supra* note 17.

21. Bird et al., *supra* note 17.

22. Michael Via, *The Malnutrition of Obesity: Micronutrient Deficiencies That Promote Diabetes,* 2012 ISRN Endocrinology art. 103472 (2012), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3313629/.

23. *Id.*

24. Amy Carroll-Scott et al., *Disentangling Neighborhood Contextual Associations With Child Body Mass Index, Diet, and Physical Activity: The Role of Built, Socioeconomic, and Social Environments,* 95 Soc. Sci. & Med. 106 (2013), https://perma.cc/Y3E3-DU4G.

25. *Id.*

26. *Id.*

27. Kimberly Morland et al., *Supermarkets, Other Food Stores, and Obesity: The Atherosclerosis Risk in Communities Study,* 30 Am. J. Preventive Med. 333 (2006), https://perma.cc/BCZ7-6BM8 (defining "supermarkets" as "large corporate owned 'chain' food stores, distinguished grocery stores, or smaller non-corporate-owned food stores. Convenience stores included all food stores that carry a limited selection of foods, mostly snack foods, whether or not attached to a gas station.").

28. *Id.*

29. Carroll-Scott et al., *supra* note 24.

30. Paula Dutko et al., Economic Research Service, U.S. Department of Agriculture, Characteristics and Influential Factors of Food Deserts (2012) (ERR-140), https://www.ers.usda.gov/webdocs/publications/45014/30940_err140.pdf.

31. *Id.*

32. Some have added "food apartheid" as a way to describe the food injustice happening throughout the United States. *See* Christine Byrne, *It's Great That We Talk About "Food Deserts"—But It Might Be Time To Stop,* Huffington Post (July 4, 2019), https://www.huffpost.com/entry/food-desert-problem-access-healthy-options_n_5d1b910ee4b082e55370dee5 (quoting Professor Ashanté M. Reese as defining food apartheid as "intimately tied to policies and practices, current and historical, that come from a place of anti-Blackness").

33. Economic Research Service, U.S. Department of Agriculture, *Food Security and Nutrition Assistance,* https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/food-security-and-nutrition-assistance/ (last updated Sept. 30, 2021).

34. *Id.*

35. Economic Research Service, U.S. Department of Agriculture, *Definitions of Food Security,* https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx#characteristics (last updated Sept. 8, 2021).

36. Feeding America, The Impact of the Coronavirus on Food Insecurity in 2020 & 2021 (2021), https://www.feedingamerica.org/sites/default/files/2021-03/National Projections Brief_3.9.2021_0.pdf.

37. *Id.*

38. Economic Research Service, *supra* note 33.

39. Food and Nutrition Service, U.S. Department of Agriculture, *Supplemental Nutrition Assistance Program (SNAP)*, https://www.fns.usda.gov/snap/supplemental-nutrition-assistance-program (last visited Nov. 3, 2021).

40. Elsadig Elsheikh & Nadia Barhoum, Structural Racialization and Food Insecurity in the United States (2013), https://belonging.berkeley.edu/sites/default/files/Structural%20Racialization%20%20%26%20Food%20Insecurity%20in%20the%20US-%28Final%29.pdf.

41. Courtney H. Lee, *Grocery Store Inequity,* Sojourners (Apr. 2017), https://perma.cc/UXW9-BTXX.

42. *Food Deserts in America (Infographic)*, Tulane Univ. Sch. Soc. Work Blog (May 10, 2018), https://perma.cc/7KE7-Q7VS.

43. *Id.*

44. Brian J. Thomas, *Food Deserts and the Sociology of Space: Distance to Food Retailers and Food Insecurity in an Urban American Neighborhood,* 4 Int'l J. Humanities & Soc. Sci. 1545 (2010), https://publications.waset.org/10864/pdf.

45. *Id.*

46. Dutko et al., *supra* note 30.

47. *Id.*

48. *Id.*

49. Amanda Merck, 5 *Ways Our Current Food Systems Make Us Sick,* Salud America! (Jan. 24, 2020), https://salud-america.org/5-ways-our-current-food-systems-make-us-sick/.

50. *Id.*

51. *Id.*

52. *Id.*

53. *Id.*

54. *Id.*

55. ATTRA, Food Miles: Background and Marketing (2008), https://attra.ncat.org/product/food-miles-background-and-marketing; *Food & Transportation*, Conscious Club (May 21, 2019), https://www.theconsciouschallenge.org/ecologicalfootprintbibleoverview/food-transportation.

56. David Pimentel et al., *Energy in Food Production,* 38 Am. Biology Teacher 402 (1976).

57. Christine Sauer, *Is Local Food More Expensive? A Grand Rapids Case Study* (Grand Valley State Univ. Honors Projects, No. 156, 2012), http://scholarworks.gvsu.edu/honorsprojects/156.

58. *Id.*

59. *Id.*

60. Double Up Food Bucks Michigan, *Get Double the Fruits and Veggies,* https://doubleupfoodbucks.org/ (last visited July 16, 2021).

61. Emily B. Leib et al., Blueprint for a National Food Strategy (2017), https://foodstrategyblueprint.org/wp-content/uploads/2020/10/Food-Strategy-Blueprint.pdf.

62. Amy Leibrock, *Good Growth: Farmers Markets Still on the Rise,* Sustainable Am. (Aug. 6, 2014), https://sustainableamerica.org/blog/good-growth-farmers-markets-still-on-the-rise/.

63. Farmers Market Coalition, *Farmers Markets Support Healthy Communities,* https://farmersmarketcoalition.org/education/farmers-markets-support-healthy-communities/ (last visited Nov. 3, 2021).

64. Zach Conrad et al., *Relationship Between Food Waste, Diet Quality, and Environmental Sustainability,* 134 PLoS ONE e0195405 (2018), https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0195405; Chris Mooney, *The Staggering Environmental Footprint of All the Food That We Just Throw in the Trash*, Wash. Post (Apr. 18, 2018), https://www.washingtonpost.com/news/energy-environment/wp/2018/04/18/americans-waste-about-a-quarter-of-the-food-they-buy-and-the-environmental-consequences-are-staggering/.

65. Ryan Cooper, *Food Waste in America: Facts and Statistics,* Rubicon (Aug. 25, 2020), https://www.rubicon.com/blog/food-waste-facts/.

66. Conrad et al., *supra* note 64.

67. Center for Sustainable Systems, University of Michigan, U.S. Environmental Footprint Factsheet (2021), https://css.umich.edu/factsheets/us-environmental-footprint-factsheet.

68. Cooper, *supra* note 65.

69. Adrienne Berard, *Study Calculates True Cost of Food Waste in America,* William & Mary (Apr. 20, 2020), https://www.wm.edu/news/stories/2020/study-calculates-true-cost-of-food-waste-in-america.php.

70. Media Release, FiBL, Food Wastage Costs the World 2.6 Trillion Dollars Each Year, FiBL (Oct. 1, 2014), https://www.fibl.org/en/info-centre/news/food-wastage-costs-the-world-2-6-trillion-dollars-each-year.html.

71. *Id.*

72. Dana Gunders, NRDC, The Dating Game: How Confusing Food Date Labels Lead to Food Waste in America (2013), https://www.nrdc.org/resources/dating-game-how-confusing-food-date-labels-lead-food-waste-america.

73. Susan Salisbury, *EXCLUSIVE: Farms Leave Produce to Rot in Fields as Crop Prices Plummet,* Palm Beach Post (Jan. 12, 2017), https://www.palmbeachpost.com/business/exclusive-farms-leave-produce-rot-fields-crop-prices-plummet/QloOnGlEff02JwTCzDR5GI/.

74. *Id.*

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75. *Id.*
76. University of Arkansas School of Law, Food Recovery: A Legal Guide (2013), https://law.uark.edu/documents/2013/06/Legal-Guide-To-Food-Recovery.pdf.
77. *Id.*
78. *Id.*
79. *Id.*
80. Cooper, *supra* note 64.
81. Sarah J. Morath, *Regulating Food Waste,* 48 Tex. Env't L.J. 239 (2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2945600.
82. Richard Halopka, *The High Cost of Soil Erosion,* Farm Progress (Sept. 27, 2017), https://www.farmprogress.com/soil-health/high-cost-soil-erosion.
83. Matt Hansen, *America is Running Out of Soil,* Week (May 13, 2015), https://theweek.com/articles/554677/america-running-soil.
84. Maria Gerasimova et al., *Introduction* in Status of the World's Soil Resources (Food and Agriculture Organization of the United Nations 2015), http://www.fao.org/3/bc590e/bc590e.pdf.
85. Soil Is a Non-Renewable Resource. Its Preservation Is Essential for Food Security and Our Sustainable Future (2015), http://www.fao.org/resources/infographics/infographics-details/en/c/278954.
86. Dede Sulaeman & Thomas Westhoff, *The Causes and Effects of Soil Erosion, and How to Prevent It,* World Res. Inst. (Feb. 7, 2020), https://www.wri.org/insights/causes-and-effects-soil-erosion-and-how-prevent-it.
87. *Id.*
88. *Id.*
89. Steven Shrybman, West Coast Environmental Law Association, Trade, Agriculture, and Climate Change: How Agricultural Trade Policies Fuel Climate Change (2000), https://www.iatp.org/sites/default/files/Trade_Ag_and_Climate_Change.pdf.
90. U.S. Environmental Protection Agency, *Sources of Greenhouse Gas Emissions,* https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions (last visited July 9, 2021).
91. U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks,* https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks (last visited July 9, 2021).
92. Patrick Canning et al., Economic Research Service, U.S. Department of Agriculture, Energy Use in the U.S. Food System (2010) (ERR-94), https://www.ers.usda.gov/publications/pub-details/?pubid=46377.
93. Shrybman, *supra* note 89.
94. U.S. Environmental Protection Agency, *The Sources and Solutions: Agriculture,* https://www.epa.gov/nutrientpollution/sources-and-solutions-agriculture (last visited July 9, 2021).
95. *Id.*
96. *Id.*
97. *Id.*
98. *Id.*
99. *How Fertilizers Harm Earth More Than Help Your Lawn,* Scientific Am. (July 20, 2009), https://www.scientificamerican.com/article/how-fertilizers-harm-earth.
100. U.S. Geological Survey, The Quality of Our Nation's Waters—Nutrients and Pesticides (1999), https://pubs.usgs.gov/circ/circ1225/.
101. *Id.*
102. *Id.*
103. Economic Research Service, U.S. Department of Agriculture, *Irrigation & Water Use*, https://www.ers.usda.gov/topics/farm-practices-management/irrigation-water-use/background/ (last updated Aug. 27, 2021).
104. Leib et al., *supra* note 61.
105. *Id.*
106. Institute of Medicine & National Research Council, A Framework for Assessing Effects of the Food System 4 (Malden C. Nesheim et al. eds., 2015), https://www.nap.edu/catalog/18846/a-framework-for-assessing-effects-of-the-food-system.
107. *Id.*
108. *Id.*
109. *Id.*
110. *Id.*
111. *Id.*
112. Caspar A. Hallmann et al., More *Than 75 Percent Decline Over 27 Years in Total Flying Insect Biomass in Protected Areas,* 12 PloS One e0185809 (2017), https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0185809.
113. Krishna Ramanujan, *Insect Pollinators Contribute $29 Billion to U.S. Farm Income,* Cornell Chron. (May 22, 2012), https://news.cornell.edu/stories/2012/05/insect-pollinators-contribute-29b-us-farm-income.
114. PBL Netherlands Environmental Assessment Agency, How Sectors Can Contribute to Sustainable Use and Conservation of Biodiversity (2014), https://sustainabledevelopment.un.org/content/documents/1981cbd-ts-79-en.pdf.
115. Paul Tolmé, *The U.S. Biodiversity Crisis,* Nat'l Wildlife Fed'n (Jan. 30, 2017), https://www.nwf.org/Magazines/National-Wildlife/2017/Feb-March/Conservation/Biodiversity.
116. Utah State University Extension, *Water Quality—Agriculture,* https://extension.usu.edu/waterquality/learnaboutsurfacewater/usesofwater/agriculture (last visited July 9, 2021).
117. *Id.*
118. NABCI, *State of North America's Birds* 2016, https://www.stateofthebirds.org/2016/ (last visited July 16, 2021).
119. Bruce A. Stein et al., Precious Heritage: The Status of Biodiversity in the United States (Oxford Univ. Press 2000).
120. *Id.*
121. Center for Sustainable Systems, *supra* note 67.
122. *Id.*
123. Dorothy Blair & Jeffery Sobal, *Luxus Consumption: Wasting Food Resources Through Overeating,* 23 Agric. & Human Values 63 (2006), https://link.springer.com/article/10.1007/s10460-004-5869-4.
124. *Id.*
125. University of British Columbia, *Environmental Impact of Meat Consumption,* https://cases.open.ubc.ca/environmental-impact-of-meat-consumption/ (last visited July 20, 2021).
126. Hannah Ritchie & Max Roser, *Environmental Impacts of Food Production,* Our World in Data (Jan. 2020), https://ourworldindata.org/environmental-impacts-of-food.
127. *Id.*
128. Christopher L. Weber & H. Scott Matthews, *Food-Miles and the Relative Climate Impacts of Food Choices in the United States,* 42 Env't Sci. & Tech. 3508 (2008), https://pubs.acs.org/doi/10.1021/es702969f.
129. *Id.*
130. Shrybman, *supra* note 89.
131. *Id.*
132. Jonathan Rosenbloom, Remarkable Cities and the Fight Against Climate Change (Env't L. Inst. 2020), https://www.eli.org/eli-press-books/remarkable-cities-and-fight-against-climate-change.

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