Fall 2022

Farmstand Business Curriculum

GROW NYC

Grades 9-12

Teaching students the basics of growing food, creating a business, and working as a team to serve their community with support from GrowNYC's existing youth engagement programs.

GROW NYC

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Note to Facilitator on How to Use this Curriculum

This guide will provide some detail for facilitating each step of the project; however, we urge you to adapt these steps to best fit the specific capacity and interests of your students and school campus. Students should ideally work on this project as a whole class, so you, the facilitator, can be involved in the whole process with one group. If your class size is too large to feasibly facilitate this project with the whole group, split your class into two groups and walk each group through each stage of the project.

There are main options you can choose from to facilitate this project:
Option 1. Set up a real food access business with the intent of growing and selling produce
Option 2. Set up a hypothetical food access business with no plan to grow or sell produce

Option 1 requires growing space and a dedicated facilitator who will oversee the project ideally over multiple years. Option 2 can be facilitated virtually or on school campuses that do not have access to growing space. This curriculum is primarily oriented towards Option 1 because it requires the most preparation, however, Option 2 can be taught with a similarly serious tone, understanding that students and facilitators are role playing or pretending that they are building a real business. The skills gained by following Option 2 are still valuable and we recommend participating in this project no matter the option you have access to.

If you've selected option 1 and plan on actually growing and selling produce, we recommend referring to GrowNYC's existing food access models, or reaching out to GrowNYC School Gardens' staff for logistical support at schoolgardens@grownyc.org.

*Please read through GrowNYC's Food Justice Facilitation Guide for tips on how to teach this curriculum.

Before beginning this curriculum, it is crucial to explain to students that this curriculum is centered on creating a (real or hypothetical) food access business. The food access business they create should be based on the garden or farm on your school campus. Meaning, students will ultimately build a business that increases food access in their community by growing food on their school farm or garden and then distributing the food, either through a farmstand, a CSA, or creating a food box. In this curriculum, students will begin their project by mapping the assets they have access to in their community.

Who is GrowNYC?

At GrowNYC, we protect the environment, create green spaces, help people stay healthy, and give them opportunities to make a positive impact. Our mission is to improve New York City's quality of life through environmental programs that transform communities block by block and empower all New Yorkers to secure a clean and healthy environment for future generations.

GrowNYC was originally created in 1970 as the Council on the Environment of New York City (CENYC). Born out of the spirit of the first Earth Day, CENYC was initially a policy-based organization, writing comprehensive reports about quality-of-life issues like air quality, traffic, and noise. Our city has changed a lot since then and so have we. As the largest and most established environmental organization in NYC, we are proud to have played a pivotal role in helping New York City transform over the past five decades. Today 3 million New Yorkers each year participate in our programs. We envision a New York in which every New Yorker can flourish. Every garden. Every school. Every street. Every neighborhood. Every borough. We work in 4 main areas: conservation, green spaces, education, and food access and agriculture.

Food Access and Agriculture:
Our network of Greenmarket farmers markets, Farmstands, Fresh Food Box pick-ups and Wholesale ensures that all New Yorkers have access to the freshest, healthiest local food. We are bringing more green space to our city by building and rejuvenating community and school gardens.

GrowNYC **Farmstands** are part of a **network of food access retail sites operated by GrowNYC**, along with Greenmarkets and Fresh Food Box sites. Through Farmstands, GrowNYC trains and employs young people to sell fresh, affordable food in neighborhoods across NYC. The food sold at Farmstands is grown by farmers in the Northeast and transparently sourced through GrowNYC Wholesale. This vital food access program offers important job opportunities for young New Yorkers, ensures healthy, fresh food access across the city, and provides vital revenue for family farms in the Northeast. GrowNYC Farmstands were formerly known as Youthmarkets.

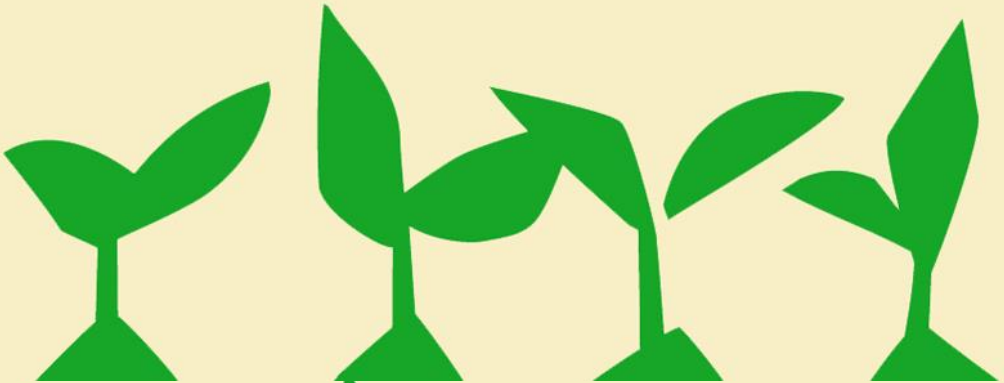
Education:
We foster future environmental stewards by providing 70,000 children each year with programs that provide meaningful interactions with the natural environment.

Conservation:
We are providing outreach and education to increase participation in the city's Zero Waste Programs and help conserve natural resources. We blanket the five boroughs with resources like textile and food scrap collection, Stop 'N' Swaps, and free training to make waste reduction easy for all.

Green Spaces:
We are transforming our regional food system and ensuring that all New Yorkers have access to the freshest, healthiest local food. We build and support community and school gardens through volunteer days, technical assistance, training, school garden grants and more.

UNIT 1:

Getting to Know the Local Food System



Lesson 1: Food Systems

OBJECTIVE

In this lesson, students will learn about some of the nuances of food systems at varying scales while being introduced to GrowNYC. Students will be asked to break down the local food system surrounding their school to identify real-world stakeholders in their community.

Grade Level: 9-12

Length of Time: 45 mins

VOCABULARY

Consumption, distribution, food access, food Production, food security, food system (global, regional, and local), processing, retail and market, stakeholder, waste recovery

BACKGROUND INFORMATION

What is a food system?

A food system involves the lifecycle of steps and processes around production, processing, transport, and consumption of food, including stakeholders at each level.

A stakeholder is a person who provides services, support, resources or ideas for a community, organization, project, or industry within a system. You can remember this by breaking down the word: a stakeholder holds a stake in the outcomes of a system, because they are a part of the system.

Figure 1: Broad example of a food system

A **local food system** is a collaborative network that supports sustainable food production, processing, distribution, consumption, and waste management. Local food systems operate in order to enhance the environmental, economic, and the social health of a particular area. The local food system includes farms of all sizes, producing a diverse range of foods, fibers, and fuels adapted to local and regional markets. It uses science and culture-based practices to maximize productivity and profit while minimizing environmental damage. Local food follows the principles of agroecology, the science of managing farms as an ecosystem.

By working with nature rather than against it, farms using these principles can avoid damaging the natural environment without sacrificing productivity or profitability. Local food also promotes economic resiliency, diverse crops, and medicine centered on culture and cultural integration. Local food forces cooperation from larger industries through community cooperation, market investment, public demand and influencing supply and demand through a cooperative and social justice lens.

A **regional food system** consists of multiple marketing and distributing options for farms of all sizes. In New York City, our regional food system spans across the Northeast of the US, including states

like New Jersey, Massachusetts, Maine, Vermont, Pennsylvania, etc. This provides farmers with more market opportunities throughout various supply chain structures. Issues concerning the regional food system include how it's managed, cost of food production and its sustainability. Other concerns are food waste, how food production affects the natural environment and the health impact of food on individuals and the population.

What happens at each step of the food system?

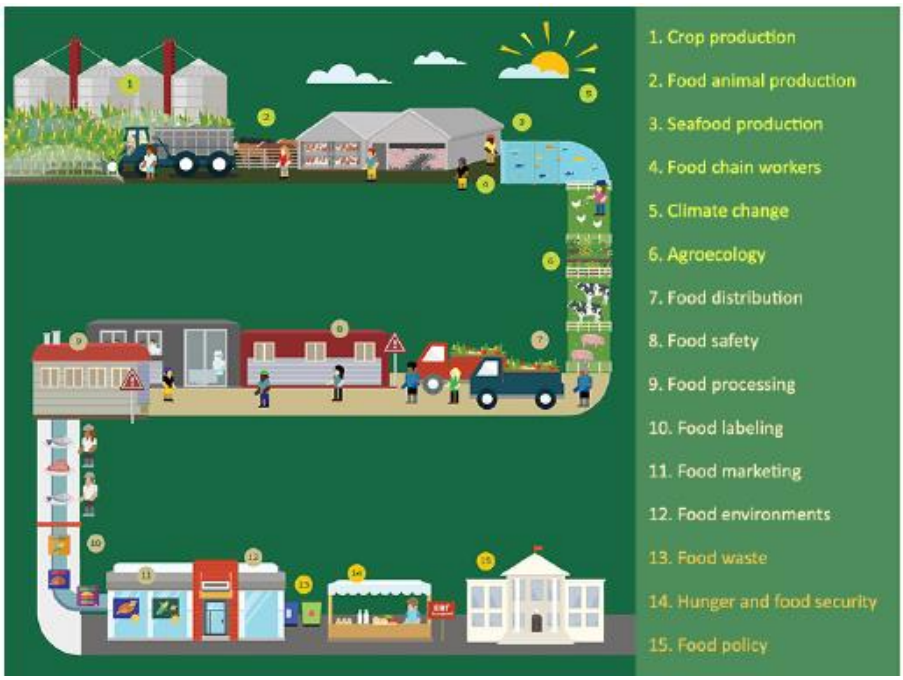


Figure 2: Example of a regional food system

Food Production: The growth of plants or animal products for human consumption, also known as the act of farming.

Processing: A series of mechanical or chemical operations in order to change or preserve goods.

Distribution: Getting goods from the production and processing stage to other businesses that will then sell to consumers.

Retail and market: The selling of goods directly to the public (consumers) at retail price.

Consumption: To fully use and dispose of resources.

Waste recovery: Diverting and reducing quantities of waste through various channels including, eco-friendly packaging, recycling, composting etc.

What is food access?

Food Access means having the ability to get good food. Good food is nutritious, high quality, affordable, and culturally relevant. The USDA describes this phenomenon: "Consumer choices about food spending and diet are likely to be influenced by the accessibility and affordability of food

retailers—travel time to shopping, availability of healthy foods, and food prices. Some people and places, especially those with low income, may face greater barriers in accessing healthy and affordable food retailers, which may negatively affect diet and food security."[1]

Access to good food is a human right, yet millions of people in the US and around the world, don't have access. That is why learning about food and supporting communities by distributing good food is crucial to our local ecosystem.

What is food security?

The USDA describes food security as: "'when all people at all times have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life' and affects people through both under and overconsumption. Food security requires that food be simultaneously (1) available—that it exist in a particular place at a particular time, (2) that people can access that food through economic or other means, (3) that people can utilize the food that is available and accessible to them, and (4) that each of these components be stable over time. Constrictions within any of these components can result in food insecurity."[2]

The opposite of food security is food insecurity. The Food and Agriculture Organization (FAO) of the United Nations states: "A person is food insecure when they lack regular access to enough safe and nutritious food for normal growth and development and an active and healthy life."[3]

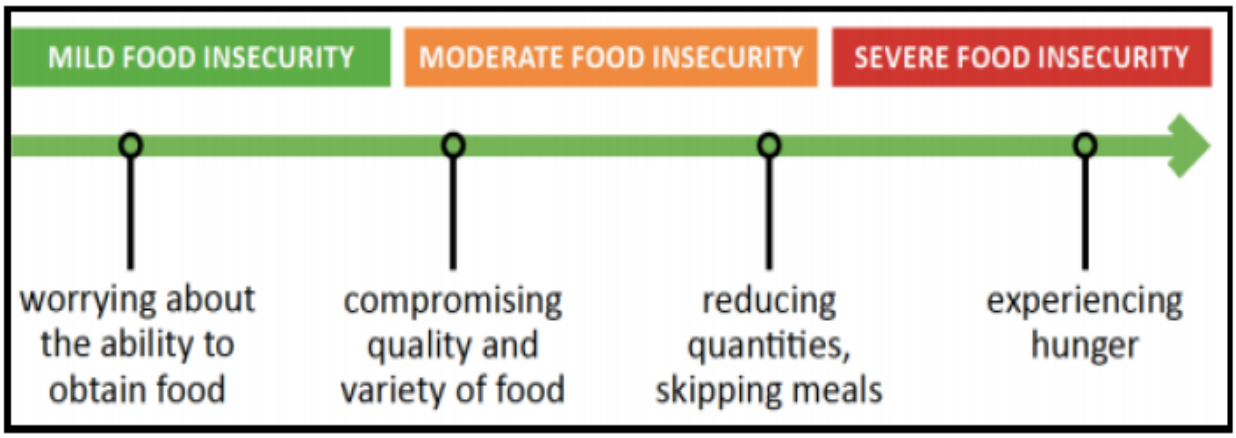


Figure 3: The range of food insecurity

How does New York City's food system work?

The NYC food system is a complex network of transportation, distribution, and retail that works in coordination to feed over eight million residents of the city. Comprising approximately 20,000 restaurants, 13,000 food retailers, 1,600 public schools, numerous hospitals, and other nonprofit service providers, as well as 90 farmers' markets, the food system is decentralized and highly complex. There is no central hub or authority governing the supply, quality, and availability of food, although there is already significant regulation around permitting, zoning, and other oversight areas. The city is a major distributor of food, such as the Hunts Point Terminal Market and supply chains developed by Chinese, Caribbean, and other immigrant communities.[4]

New York City also sits at the heart of a lush agricultural region, with hundreds of dairy, meat and produce operations within a few hour's drive. The vast majority of NYC food businesses are independently owned and operated, a big difference from the corporate dominated foodscapes of many metro areas. Nineteen billion pounds of food enters the city annually, yet nearly 1.6 million residents are food insecure. GrowNYC is dedicated to helping New Yorkers with food access and food security within our complex and diverse local food system.

PROCEDURE

1. Let's explore food systems in our communities. First, break students up into small groups.
2. Ask students to make a list of the food stakeholders they can think of that are located around the school community. This list should include anyone they can think of, from cafeteria staff to deli cashiers, to their favorite food stands.
3. Pass out the accompanying worksheet (next page).
4. As a class, discuss the people that make up a food system. Who is in charge of food production, processing, distribution, retail, consumption, and waste recovery? Take notes that students can refer to throughout the activity.
5. Ask students to place each stakeholder at their respective points within the system in the gray circles on the worksheet. Students should ask themselves:
    - Where do I get food from at my school?
    - What restaurants, delis, and grocery stores do I go to get food?
    - Where is that food sourced from?
    - Who are my local food producers and distributors?
    - Who grows this food?
    - Are there any urban farmers by your school or in your borough?
    - If the food requires processing, are there any food processing sites around you?
    - Where does my food waste go? Who manages the food waste?
6. Once students have gone through each point in the food system, have groups share out their stakeholders as a class. Discuss these questions:
    - Which point in the food system was hardest to pair with stakeholders? Why do you think that is?
    - Which point was easiest to pair with stakeholders?
    - Do you have relationships with any stakeholders?
    - Was every point in the food system represented within your community or did you have to go outside of your school neighborhood to find stakeholders to include in your list? What is missing in your community?

- Facilitator's note: Make sure students keep their work from this lesson, it will act as a prerequisite for the following lesson.

EXTENSION

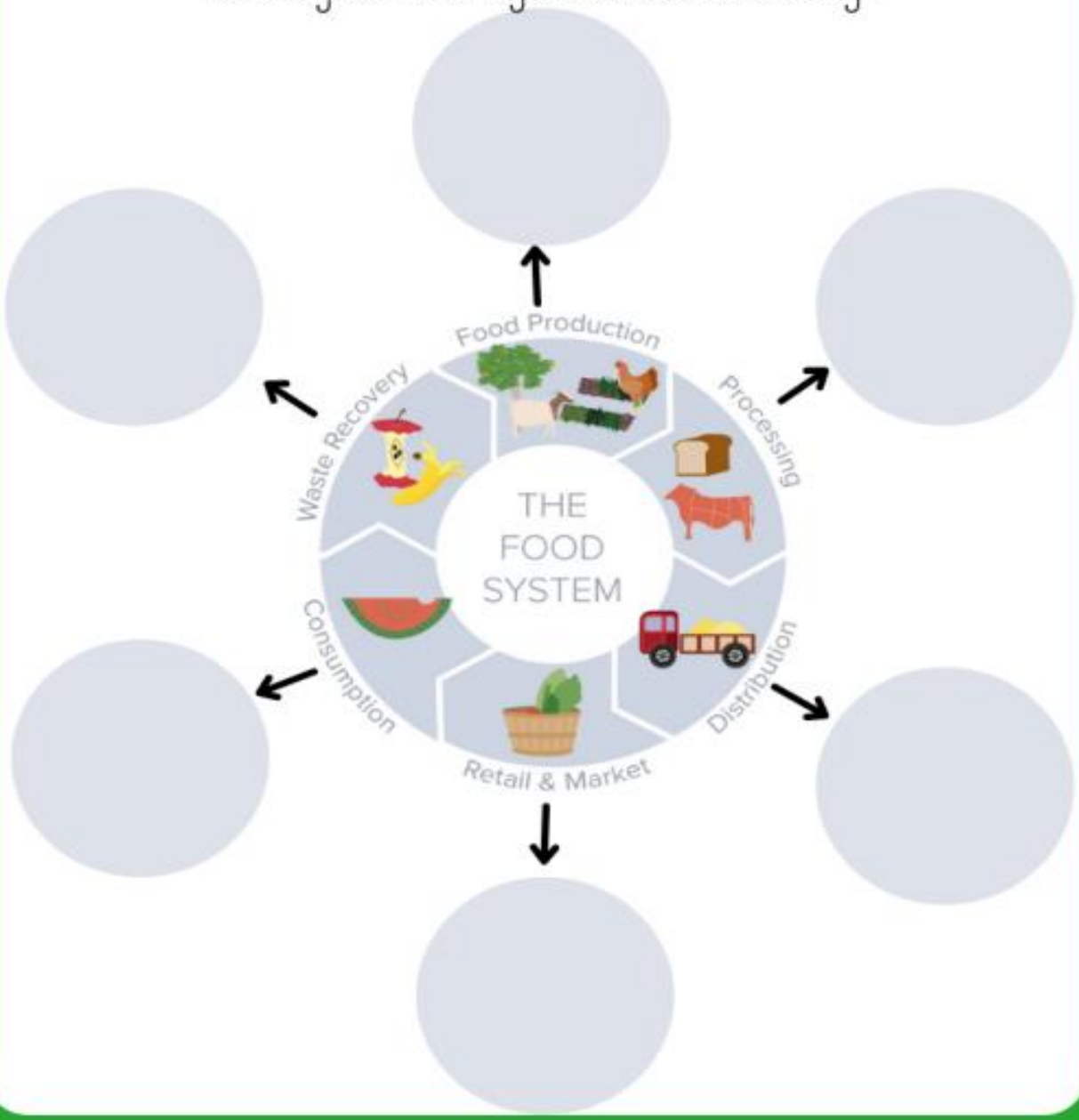
- Think of a food or food product that you consume regularly, anything from an apple to a bag of chips. Use the food system chart to understand how your food travels through each stage of the food system process. Map out the process from start to finish:

  Food production → Processing → Distribution → Retail and Market → Consumption → Waste Recovery
- If you have access to computers, take some time to research specific farms or companies that produce the food you chose, identify distribution companies, brainstorm where the food is sold to consumers, and ways it is eaten. Add as much detail as you can to your story.

Name: _____ Date: _____

FOOD SYSTEM EXPLORATION

In these circles, make a list of stakeholders at each point of the local food system within your school community.



Lesson 2: Introduction to Farming

OBJECTIVE

In this lesson, students will explore different types of farming, brainstorm gaps that exist in their local food system, and build on their system map from Lesson 1.

Grade Level: 9-12

Length of Time: 45 mins

VOCABULARY

Animal husbandry, industrial agriculture, orchards, organic farming, organic food, small scale farming, urban agriculture

BACKGROUND INFORMATION

What is small scale farming?

Farms that don't fall under the industrial or conventional category are often described as small-scale, local, sustainable or some combination, depending on the specific farm in question.
These types of farms usually use less machinery and fewer chemical inputs, help with carbon capture, steward biodiverse and pollinator habitats, and are sometimes considered organic. All in all, an industrial food system does not align with a just and sustainable vision for the future.
For more information, read this article that summarizes issues with industrial agriculture and climate change from the Union of Concerned Scientists. Watch the movie Food Inc. for additional information about industrial agriculture.

What is industrial agriculture?

Industrial agriculture (also referred to as conventional agriculture) is a form of farming that refers to the industrialized production of crops, animals, and animal products like eggs or milk.

The industrial food system and industrial agriculture centers capitalism, Western imperialism, and extractivism as a means to generate profit, and in turn, sacrifices overall public health and the well-being of its consumers and producers for profit. Some of the harms associated with industrial agriculture include intensive inputs of dangerous chemicals, such as fertilizers, pesticides and herbicides, large machinery that devastates the land, monocrop production which threatens biodiversity, and the global spread of patented seeds and Genetically Modified Organisms which forces farmers' reliance on mega corporations.

Industrial agriculture is not designed to listen to the needs of the land, soil, water, people, and overall ecosystems. Industrial agriculture is not climate resilient and makes consumers and producers significantly more vulnerable to climate disasters. Its reliance on fossil fuels within the food production process, as well as its emissions for transportation and processing, has led to insurmountable greenhouse gas emissions, making it a major cause of global climate change. While industrialized farming practices are legal, it is critical for consumers to understand the costs of intensive forms of agriculture on public health and the environment. Industrialized agriculture delivers inexpensive, low-nutrient food in excessive quantities.

What are some examples of different types of farming?

Urban Agriculture: Urban agriculture, urban farming, or urban gardening is the practice of cultivating, processing, and distributing food in or around urban areas. Urban Agriculture's primary focus centers on turning empty, vacant spaces into gardens or green spaces.
Urban Agriculture also looks to redefine what is considered a green space, by repurposing existing spaces, growing in smaller spaces, and using alternative forms of agriculture in urban spaces. Urban

growing centers around community stewardship, transitioning urban spaces to incorporate more environmental equity in lower resourced areas. Urban Agriculture is a direct response to environmental racism and a lack of equity in relation to natural resources (i.e., shade, trees, clean water, clean air, ability to access green space and connect with nature etc.)

"Environmental racism is the disproportionate impact of environmental hazards on people of color."[5]

Animal Husbandry: the cultivation or production of plants or animals in agriculture, or the control and management of a branch of farming and especially of domestic animals, or conservation. Animal husbandry includes cattle farming, horse breeding, dog breeding, and sheep farming, beekeeping, aquaculture, etc. It helps in providing proper shelter for animals with full-time food and protection facilities.

Organic animal husbandry: means not only feeding organic food and avoiding synthetic food additives and synthetic medicines (e.g., antibiotics, growth hormones) but also focusing on satisfying the various needs of the farm animals.

Orchards: An orchard is considered a type of farm where fruits and nuts are grown on trees and shrubs. Examples of orchard fruits are apples, pears, oranges, bananas, and cherries. Examples of orchard nuts are pecans, walnuts, and almonds.

What does organic really mean?

The word organic is used to describe certain foods; let's explore what that really means. The government agency responsible for overseeing farming in the U.S. (the US Department of Agriculture or USDA), is tasked with helping consumers know what food is organic. The USDA defines organic as "...a [food] production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible, organic farming systems rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds, and other pests."[6]

Oftentimes in the US, people automatically think organic is always good and non-organic is therefore bad. However, it is not so black and white. Organic produce is usually more expensive to buy as a consumer, and more expensive to grow as a producer. The USDA provides a system for certifying farms that use organic farming practices. When you go to the grocery store or the farmers market and see products with a USDA organic label, this means that the food was grown from a certified organic farm.

According to the USDA, "USDA certified organic foods are grown and processed according to federal guidelines addressing, among many factors, soil quality, animal raising practices, pest and weed control, and use of additives. Organic producers rely on natural substances and physical, mechanical, or biologically based farming methods to the fullest extent possible.
Produce can be called organic if it's certified to have grown on soil that had no prohibited substances applied for three years prior to harvest. Prohibited substances include most synthetic fertilizers and pesticides."[7]

The USDA has several specific policies a farm must abide by in order to meet the certification requirements to officially be considered organic and issued the government certifications. However, there are several barriers that can make it difficult for farmers to get the organic certification.

According to a study conducted by researchers at Auburn University and Tuskegee University, "…the initial cost of certification, the costs of annual inspections required to maintain certification, and the paperwork involved with certification were the largest potential barriers to certification decisions."[8]

Additionally, the three years mentioned above mean that farmers have to wait three years before they can harvest produce that is technically considered organic under USDA metrics. This can be a long period for farmers to wait for certification. "During the transition period, most farms achieve lower yields than they would under conventional management. Moreover, crops and livestock products cannot be marketed as organic during this period, often resulting in substantially lower revenues for transitioning farms. There could also be additional transition costs associated with changes in machinery and equipment, navigating regulatory hurdles, and learning to manage an organic system."[9]

What are good farming practices beyond USDA organic?

For these reasons, some farmers grow their food organically, but choose not to become certified organic. This means that some farmers implement sustainable farming practices, like using less "synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives" and generally avoid industrial or conventional agriculture practices, without the ability to sell their food as technically "organic". This can make it confusing when shopping for produce. For this reason, as a consumer, if you would like to ensure the food you buy is grown in ways that are good for the earth and good for your health. There are some key words you can look out for, including sustainable, small scale, and local.

PROCEDURE

1. Let's continue to explore our place in the food system. Have students take out the food system map they made in lesson 1.
2. Recalling the discussion from lesson 1, ask students about what already exists in your community. Was every point in the food system represented within your community or did you have to go outside of your school neighborhood to find stakeholders to include in your list? If something was missing, what was it?
3. Now have students imagine: If you were to fill a gap in your community's food system based on what you identified as missing, what role would you play?
4. If students were asked to fill a role in the food systems in the food production section of their local food system, what would that look like?
5. Begin brainstorming with students about the types of farming that would be supported in and by their communities. Ask students:
    - What type of farm would help support your community?
    - What food would your community like to have better access to?
    - What space is available in your community for a farm?
    - Would your community prefer small scale farming or conventional/industrial farming?
    - How can the farm be accessible to the whole community?
    - Should the farm be organic? How does that shape the farming practices used?
    - What kinds of farming practices are most relevant to your community?
    - How would this farm support what's already happening in your community?
6. Based on what was explored in the background information section of this lesson, discuss the different types of farming practices they think should hypothetically be implemented in their community.
7. After the brainstorm and discussion, have students redraw the food system map to include their new idea for filling gaps in their community. (i.e., impacting the food production portion of the system also impacts waste recovery.) Have them highlight the sections of the food system map that they would be directly impacting. Ask students:
    - What area of the food system are you impacting? How are you impacting it?
    - How does this new local food system map help support the community?
    - What other parts of the food system will be influenced based on your role in the community?

EXTENSION

- Research community gardens in your neighborhood and visit them to examine the farming practices they are using. What are they growing? How are they growing it? How are different cultures influencing growing styles and practices? What can you learn from farmers who use a multitude of farming practices in one space? (i.e., Growing fruits and supporting a beehive)
- Investigate the food at your local grocery store to determine where the food is sourced from and what scale of food system your grocery store is a part of. Place the food you find at the grocery store within a food system map. Is the food coming from your local food system, regional food system, or international food system? Is the food in your grocery store grown locally or from faraway places? Is the food certified organic?

- Research urban farms in NYC. Some examples to start off from are: Red Hook Farms, Queens County Farm, Randall's Island Urban Farm, What makes their farm unique, and who are the communities they serve? Outline their business model.

Lesson 3: Agriculture (Ag) Science

OBJECTIVE

In this lesson, students will learn some basic agricultural science and will then be challenged to create an asset map based on the resources available to them in their community.

Grade Level: 9-12

Length of Time: 45 mins

VOCABULARY

Asset map, climate, photosynthesis, planting zones, seasonal charts, seeds

BACKGROUND INFORMATION

How is food grown?

Plants are essential to all life on Earth. Plants make their own food by a process called photosynthesis where they take in carbon dioxide from the atmosphere and turn it into sugar. The sugars can then be used for energy for growth and many more functions, but the plant material provides the basis of almost all food chains.

Plants are living things; they grow and reproduce like any other living thing. They follow a cyclic process of starting a new life, growing, and then coming back to the starting stage (reproducing). There are 5 stages in the plant life cycle:
Seed → germination → growth → reproduction → pollination → seed spreading stages

Plants, like all living things, have basic needs that must be met for them to survive. These needs include light, air, water, a source of nutrition, space to live and grow and optimal temperature. Plants are made up of many different parts, including a stem, leaves, roots, flower, fruit, and seed. To learn more about the parts of a plant, use this resource and for more about plant biology check out this source.

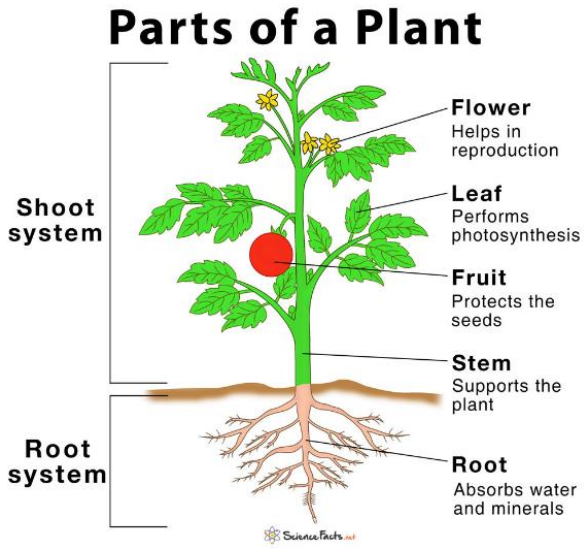


Figure 4: Parts of Plant

What is needed to grow food?

Sun: Plants require light to grow, specifically in the form of solar energy or sometimes grow lights. Before choosing the location of a farm, it is important to conduct sun mapping, to identify the varying degrees of sun and direct sun a specific site receives. This can be done simply by observing what

direction the sun rises and sets. Guiding questions: What areas of the space receive the most sun? How many hours of direct sun do you receive?

*Healthy Soil***:** Soil is a living and life-giving natural resource. Proper soil health can be maintained by soil testing, no-till methods, and crop rotation. Additionally, nutrients can be added to soil by incorporating organic material like compost. Compost is considered decayed organic matter and used as a plant fertilizer. Proper soil health can support water retention, improve nutrients, capture carbon, biodiverse soil microorganisms, improve wildlife and native pollinator spaces. Interactive learning experience here that shows how you can build your soil health.

Water (Access to water, Irrigation & Rainwater harvesting): Water is one of the most important aspects of growing food. There are a number of communities that don't have access to clean drinking water, so other means of accessing water are integral to survival. Those that have access to safe drinking water should implement water retention methods like installing a drip irrigation system. There are many ways to collect and distribute water, including: drip irrigation, utilizing hydrants, rainwater catchment, etc.

Energy: Farms also require energy, which they source from renewable energy like solar or wind and fossil fuels like gas or oil. Things on a farm that typically require energy include irrigation systems, large machinery, tools like mowers and weed whackers, the energy required for the transportation of goods, etc. This is sometimes a limiting factor of a farm, it can be very costly and environmentally unsustainable, therefore energy should not be overlooked. For more educational resources on energy, check out Solar One's programming and curricular offerings.

Farmers who are concerned with their environmental impact and climate change can try to decrease their farms' reliance on non-renewable energy such as carbon-based fossil fuels, coal, natural gas and nuclear power. With renewable energy technology becoming more accessible, farmers are starting to integrate solar and wind energy to their farm systems, which can often reduce operating costs as well.

Climate: Climate is the long-term pattern of weather in an area, typically averaged over a period of 30 years. Understanding climate in your area can help influence the types of crops that you plant and the measures you take to support your garden.

Planting zones: Planting zones can give you an easy way to understand when to plant your crops. Planting zones tell us ultimately the temperature of the specific zone. New York's zone ranges from 3a to 7b, meaning there is a wide variety of plants that you can grow based on location, water, sun placement etc. To learn more about planting zones, use this resource.

Seasonal charts: FoodPrint's Seasonal Food Guide is a detailed, easy to use resource for fruit and vegetable seasonality. Find out what fruits and vegetables are available throughout the year, as well as nutrition, cultivation, and cooking information. Also available via the FoodPrint Seasonal Food Guide app. New York State Department of Agriculture's seasonal harvest calendar shows the different harvest times for foods grown in the Northeast in commonly spoken languages.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Vegetables:												
Asparagus												
Beans, String *												
Beans, Shell												
Beets												
Beet Greens												
Broccoli												
Brussels Sprout												
Cabbage												
Carrots												
Cauliflower												
Celery												
Collard Greens												
Corn *												
Cucumbers *												

Figure 5:Seasonal Food Chart

Seeds: Seeds carry the history of the plant, the evolution of the plant species and a connection to culture and the cultural use of that crop and seed. Seeds that have been carried for a long time can be described as Heritage seeds or Heirloom seeds. Accessing seeds should be an intentional act that reflects community demographics, your current crop plan, supports biodiverse species and animals, and is sustainable. That means sourcing from ethical, local, Indigenous and BIPOC farmers for seeds and seedlings with the healthiest community benefits.

Industrial agriculture has created an unjust relationship with farmers and seeds. Through "technological advancement" like genetic modification of seeds farmers have been left with the bill when these "super seeds" cannot actually reproduce. Meaning every year, farmers have to repurchase seeds and, in some cases, have even been dis-incentivized, sued or threatened if they tried to save seeds.

Some ethical forms of seed keeping include utilizing a seed library, participating in seed exchanges, sourcing from ethical seed distributors, prioritizing seed keeping for native and pollinator habitats. Some growers with limited resources will also source seeds from fresh organically grown crops, this can help to support start-ups and small-scale operations. Stewards and Seed keepers should seek to de-commercialize access to seeds, support heritage crops, and help stop the extinction of native crops and species for ecological, cultural, and financial benefits. To learn more about GMO's and seeds check out this resource.

Before purchasing your seeds, research to find out if there are any local seed libraries or stewards offering up free seeds. Here are some free or reduced cost seed libraries in the NYC area:

- Reclaim Seed NYC- Queens
- New York Public Library- Manhattan
- Brooklyn Public Library
- NYC Parks Department

Access to Plants: Accessing plants and seedlings can come in a variety of forms, from connecting with local growers who grow seedlings for production or commercial use, to raising your own seedlings, or sourcing free seedlings from charity organizations, grocers, nurseries, flower shops and more.

Community resources: Resources can come in many forms. Money is a resource needed for farming, but other resources exist. One helpful way to determine what resources you have access to is called asset mapping. People can think of asset mapping as categorizing skills, time, network (professional and personal), potential partners, free sourced materials (identifying dumping areas and collecting valuable materials) and people power.

The most important part of this assessment is factoring in the natural environment and the current ecosystem that the space currently supports. What animals, insects, fungi and people are currently using this space? How can new resources and a redevelopment of this space be incorporated into patterns already happening, or how do we create healthier patterns of interactions for the space? Who are the change makers and elders in the community, how can their cosign support future and current projects? What are some natural barriers that the space is exhibiting? (flooding, run-off, trash management, rat mitigation etc.)

Resources can also include access to free or low-cost training and materials. For example, GrowNYC's Beginner Farmer Course: GrowNYC Farm Beginnings is a comprehensive agricultural course developed for farmers by experienced farmers and Farmer Assistance staff. The program is designed for a wide range of participants looking to start farm enterprises, including farmers with agricultural experience from their home countries, NYC and urban farmers looking to scale-up to rural farming.

PROCEDURE

Note to facilitator: At this point in the curriculum, you will need to know if you are facilitating option 1 (creating a real food access business) or option 2 (creating a hypothetical food access business). This lesson begins to take shape around the land, garden, or farm project on your school campus. For the rest of the activities in this curriculum, students will be designing and implementing plans related to the food access business they will eventually create as a culmination of their work through this curriculum. Please explain this to students before beginning this activity and refer to the Note to the Facilitator document for further instructions on this.

1. Have students start to explore what potential resources they may have available to them. Begin by facilitating a class discussion on the definition of an asset. Ask students to define what an asset is and why it is important. For more information on assets and asset mapping, watch this video as a class. If you have time, do the activity explained in the video prior to doing this activity.
2. In small groups, have students brainstorm on paper about what assets they have access to in their communities. Asset maps can be as simple as a mind map or as intricate as an excel spreadsheet.
3. Think about what physical items you can source for free: Using Tires as a mini garden bed or turning wooden pallets into garden beds or benches or even using large bottles to create a garden wall.
4. Think about what community relationships you can source from: Parents, community members, other farmers etc. that may have specific skills. Evaluate ways that specific people or groups can support your project with the skills and resources they currently possess.
5. Think about what financial resources you can source from: Grants, Fundraisers, Cookie Drive, Donations, etc. Have students think critically about the time frame for financial support and the best methods to implement based on their current resources.
6. Have students share their group asset maps to the class to explore different ideas of assets and collectively explore the potential resources that may be available to them.

EXTENSION

- Create one mega-asset map as a class by combining the assets from all of the asset maps from each small group. Students can then refer to this one asset map throughout the whole curriculum and food access project.
- Before you can start considering what to grow in your garden or farm, a good first step would be to determine the health of your soil. Soil testing is the best way to get information about your soil and determine the which crops would do well in it
    - Healthy soils, Healthy Communities- soil health resources
    - Soil testing services from Cornell Cooperative Extension
        - Sample collection
        - Completing submission forms
        - Understanding and interpreting your results
- Look at existing GrowNYC material on composting to explore the potential benefits of using compost in your garden.
    - Learn how to make compost at home
    - Beginner intensive- Home composting

    - Soil health and composting
- The food you eat can be a good source of seeds and this workshop can help you learn how to save your own seeds for planting

Lesson 4: Land Usage

OBJECTIVE

In this lesson, students will learn about community gardening, the Land Back movement, and Land Liberation. The activity highlights the benefits of community gardening and places them in the shoes of community stakeholders.

Grade Level: 9-12

Length of Time: 45 mins

VOCABULARY

Community gardens, land access, Land Back Movement, land liberation

BACKGROUND INFORMATION

What native land are we on?

Nearly 400 years ago, Dutch settlers in New Amsterdam attempted to make treaties with the Lenape people who stewarded land in the Americas. The land of the Lenapehoking stretched from New York City to Philadelphia, including all of New Jersey, eastern Pennsylvania, northern Delaware, and southeastern part of Connecticut. Within the Lenape people were major clans including The Minsi (also known as Munsee) or wolf, the Unami or Turtle and the Unalachtgo or Turkey. The Minsi occupied lower New York and upper New Jersey, the Unami occupied central New Jersey and parts of Pennsylvania, and the Unalachtgo occupied lower New Jersey.

There are some historical accounts that reference the 1621 “sale” of Manhattan between Dutch settlers and the Lenape people however there is no validity to this claim. Shortly after the “sale”, tensions rose between the groups, bringing about mass massacres of native people, and the displacement of Lenape people from their lands.

Map of Lenape languages and Tribes-image from Wikimedia Commons

Figure 6: Map of Lenape Languages and Tribes

The Land Back Movement and Land Liberation work is an important step in acknowledging this gruesome history, to give indigenous people back the land and resources that are rightfully theirs. Another, smaller daily act people do to support Native people is through Living Land Acknowledgements, which work to acknowledge the first people who had originally inhabited and stewarded this space.[10] It is usually in the form of a statement or an honor, given to the known ancestors of said land, it can be a general statement, an art installation, or a conscious act to provide space and land for native people most affected.[11]

What is the Land Back Movement?

Land Back is a political framework and movement that advocates for the rematriation of land; rematriation meaning returning rightful decision-making powers to Indigenous communities for political, economic, spiritual purposes.

The Land Back movement comes from the most grassroots land defenders across the country, who now see their local battles as part of a larger mobilization to reassert Indigenous control over their traditional territories. Much of the land on this continent was stolen from Indigenous peoples who stewarded the land for thousands of years. The Land Back Movement seeks the return of these lands so that the land can once again be cared for, stewarded, and Indigenous people can continue their sociopolitical and cultural practices. The Land Back movement seeks to increase agency and access to culturally appropriate and affordable food for communities. The movement does not ask current residents to vacate their homes, but maintains that Indigenous governance is possible, sustainable, and preferred over colonial and state-owned land uses.

During colonization, White settlers stole a lot more than just the land. They took away the political and decision-making power of Indigenous peoples and their right to consent to what happens to their land, people, families, and even their own bodies. Their spiritual beliefs and languages were violently outlawed, and many children were forcibly taken to boarding schools, some never to be seen or heard from again. For these reasons, land back has become a symbol of the reclamation of everything that was taken and destroyed through the ongoing process of colonialism.

To learn more about Land Back and how Native & Indigenous people are rematriating stolen land, check out this video.

What are land liberation projects?

Inspired by the agency and ingenuity of BIPOC farmers, land liberation projects seek to reclaim the heritage of the land for Black and Brown people. Liberating Black and Brown farmers from historical trauma and sharing new and old ideas about connecting to the land. Check out the Northeast Farmers of Color Land Trust's Reparations Map to learn more about a local initiative for Reparations and Rematriation for Black-Indigenous Farmers in the Northeast.

One example is Soul Fire Farm, an Afro-Indigenous centered community farm committed to uprooting racism and seeding sovereignty in the food system. There they are raising and distributing life-giving food as a means to end food apartheid. With deep reverence for the land and wisdom of our ancestors, Soul Fire, works to reclaim the collective right to belong to the earth and to have agency in the food system. They bring diverse communities together on their healing land to share skills on sustainable agriculture, natural building, spiritual activism, health, and environmental justice. They are training the next generation of activist-farmers and strengthening the movements for food sovereignty and community self-determination. The Land SkillShare Video Series and additional resources can be found here.

All these models challenge growers to be resourceful when considering what levels of access, they have in any one space.

What are community gardens?

Most community gardens serve as an act of resistance to capitalism and systems of oppression with the goal of providing quality of life services to community members. Having access to green space is a human right and rallies against all systems that would profit off of or restrict people's connection to nature and food. In NYC, an impressive amount of unconventional farming takes place at community gardens throughout the five boroughs. There are over 500 community gardens on city property, over

860+ school gardens, over 100 gardens in land trusts, and over 700 gardens at public housing developments throughout New York City. GrowNYC has built more than 135 new gardens, including community gardens; gardens in public housing developments, daycares, and senior centers; and our urban farm on Governors Island.

Community gardens are community-managed open spaces, these differ from a park or public space where some other entity decides the purpose of the site and maintains it. Community gardens are where the residents of a community are empowered to design, build, and maintain spaces in their own communities.

A community garden can be urban, suburban, or rural. It can grow flowers, vegetables, or a community. It can be one community plot or many individual plots. It can be located at a school, hospital, or in a neighborhood.

Neighborhoods with successful gardens:

- Gain food sovereignty through the process of growing food by community members for community members (see Lesson 6 for more information about food sovereignty)
- Tend to grow culturally appropriate foods
- Combat food insecurity and support food education
- Build on natural and available resources
- Fight climate change by reducing the distance food travels (see Lesson 8 for more information about food and climate change)
- Boost the local economy and create economic agency
- Improve community health through good nutrition and increased physical activity

New Yorkers can find out more information about the community gardens that we've built in the Bronx, Brooklyn, Manhattan, Queens, or Staten Island.

Interested in joining one of NYC's 500 community gardens? Find a community garden near you by using the map on Green Thumb's website.

Where else can farming take place?

It is important to expand our image of farming beyond rural land because farming happens in so many other spaces. For example, there is indoor farming (in spaces like shipping containers or warehouses), rooftop farming, community garden farming, school campus farming, aquaponics, etc., which can take place in both rural and urban settings.

When envisioning new farm projects, it is important to be creative about the space or land being used! Farming can happen almost anywhere, if you have the skills and resources to manipulate the environment to be able to grow food. Let’s challenge ideas surrounding conventional farming and opt to transition existing spaces into growing spaces. Some food growing you can do in unconventional environments, even in NYC apartments, include creating a hydroponic system in a bucket or in a closet, turning a windowsill into an herb garden, or using a gate as a growing wall.

Examples of unconventional land and space use for farming include:

- Aquaponic farming at the GrowNYC Teaching Garden on Governors Island

- Aquaponic farming at Oko Farms
- Tower Gardens at the GreenBronx Machine sites
- Hydroponic farm at the MLK Jr Educational Campus
- Rooftop farms at the Brooklyn Grange Farms
- A vacant lot transformed into a food access point at Hattie Carthan Community Garden
- Urban farm, Micro BK, grows microgreens in controlled indoor environments in Brooklyn
- White Pine Community Farm is a worker-owned food justice-centered farm

Example of other types of unconventional food businesses:

- "Small Axe Peppers Hot Sauce is made with peppers purchased from community gardens in cities across America."
- Hot Bread Kitchen is a food business that "creates economic opportunity for immigrant women and women of color through job skills training, food entrepreneurship programs, and an ecosystem of support in New York City."

Considering the history of colonization, all farming in the U.S. takes place on stolen land.

What does it mean to manipulate the environment to grow food?

Farming requires some manipulation of an environment in order to grow food. It is especially important to know how to manipulate your environment to grow food if you are using unconventional space or land for your farm project. As discussed, farmers establish systems for accessing the resources they need to be able to grow food, including access to land, water, sun, human labor, financial resources for initial investments, etc. However, there are some strategies and techniques farmers can implement to manipulate the environment that create more suitable conditions for food production

Some of these strategies and techniques include:

- Building structures: Building structures for food growing can create a more controlled environment for plants that are in a vulnerable stage of growth (seedlings), or plants that require conditions that differ from the regular environment. These structures allow farmers to change the temperature, humidity levels, amount of time plants are exposed to the sun, and the intensity of sunlight. These structures include hoop houses, cold frames, high tunnels, and greenhouses. Depending on the set up of the structure, this type of system can sometimes require energy to manipulate the conditions.
- Soil amendments: Farmers can also change the makeup of the soil by adding things to the soil to ensure the soil is ripe for growing. Some things often added are compost, manure, or soil amendments specifically manufactured to add nutrients to the soil.
- Grow lights: Provide light for plants to grow in environments where sunlight is limited.

PROCEDURE

Note to Facilitator: This lesson requires access to the internet, ideally on laptops that the students can use in class or if you are facilitating this during remote learning, students should already have laptops at home that they can use for this lesson. If you are teaching in person and don't have access to laptops but have a SMART board or projector in the classroom, follow the steps of this activity on the SMART board or projector as a class, taking volunteers from the class to take turns coming up to the computer. Alternatively, assign this activity as a take home assignment or homework.

1. Using Green Thumb's community garden map, have students find out where the closest community garden is to their house. They can do so by typing their zip code into the search bar.
2. Ask students to imagine they are community members tasked with recruiting new garden members. Have them research some specifics about the garden:
    - What is the name of the community garden?
    - How long has the garden existed?
    - Who founded the garden and why?
    - Who runs the garden?
    - When is the garden open to the public?
    - What's the process of joining this community garden?
    - Does the garden have a recurring public workday?
    - Does the garden have available garden plots for new members?
    - Does the garden have any special events, workshops or learning opportunities?
    - Does the garden take food scraps?
    - How is information shared about the garden? Do they have an internet presence (social media, website, etc.)
    - How should interested community members get in touch with the garden team? Do they have contact information, like an email or a phone number, published online?
    - What benefits would someone get if they became a member of the community garden?
3. Using the Native Land Digital's Native Land map, have students identify what native land they are on by typing their zip code into the search bar.
4. Add the following question to their community garden research:
    - What are some traditional land practices and agricultural practices used by the native tribes of the land they're on?
    - What are some ways the community garden can honor the native land that they're on?
5. Now that students have gathered all this information about the garden, have them create something to advertise garden membership to community members. This could be in the form of a brochure, a flyer, a poster, a video ad, a social media post, whatever medium you think would access the most people in your community and would compel them to join the garden.
6. Have students share-out their advertisements with the class.
7. Debrief with a discussion:
    - What role do community gardens play as food access points in NYC?

- Would you or any family or friends consider becoming a member of the community garden you chose?
- What benefits of becoming a member of a community garden excite you the most?
- How could community gardens shift their programs and offerings to be more compelling to community members?
- If you were a member of this community garden, what types of offerings would you like to see?
- If you were a member of this community garden, how would you increase food access in your community using this garden?
- If you were a member of this community garden, what plants would you like to grow?
- What advertising technique felt the most compelling to you when seeing the work of your classmates?

8. If you have time, as a class, walk over to the community garden closest to your school to see what is happening in the space. Is food growing? Do they generate compost? Do they host community events or education programs? Try to answer the questions list from above.
9. Next, ask students to visit the community garden they selected by their house on their way home from school. What descriptors or characteristics of the garden exist in real life that you didn't find in your research of the garden?
10. If students seem enthusiastic about community gardens, consider offering them extra credit to become members of their local community garden.

EXTENSION

- Find places around your community that could be turned into community gardens. Look into the history of community gardens in NYC to find out how you would go about advocating for this space to be turned into a community garden.
- Find out what Native Land you are on based on where you live using this digital tool. Research the food and agricultural practices used by the Indigenous tribes of the region to understand how food was grown prior to colonization. Next, research existing Land Back and Land Liberation projects or resources in the region to understand the current organizing landscape. How could you support the Land Back Movement in your area?
- Look into the additional resources for land access listed below. How would these support farmers in NYC and NY state? Are there any relevant resources that could support your project at school?

Land Access Resources

Below you'll find resources that can be of use to anyone interested in accessing farmland in NYC and NY State. Feel free to share these resources with your community.

Finding Land in NYC:

- Google Maps
- OASISNYC
- Living Lots NYC
- 596 Acres.org
- NYCommons.org
- Word of Mouth
- Tax map at the Dept of Finance - public records will tell you who owns a specific block & lot
- Real Estate Brokers
- Hitting the Streets
- New York Farmland for Sale

Mailing lists for these beginning farmer programs:

- GrowNYC Farm Beginning Course
- Farm School NYC Citywide course

Organizations involved with Land Access in NYC

- Green Thumb
- Bronx GreenUp
- Trust for Public Land
- New York Restoration Project
- Green Guerillas
- Bronx Land Trust
- Brooklyn/Queens Land Trust

Finding Land in NY State

- **Finding a Farm to Buy or Lease in NY (Guide by Cornell University)**
- **NY Land Quest**
- **Hudson Valley FarmLink**
- **FarmLink**
- 1-800-547-3276 provides information, consulting, referrals and resources related to transferring farm ownership to the next generation or non-family member.
- **NOFA-NY –** The Property for Rent/Sale listings are standard classified ads and are shorter in length and are not filtered by their details. Land Offered and Land Sought listings are more in-depth forms and listings for NOFA-NY's land linking database.
- **Columbia Land Conservancy Farmer Landowner Match Program –** Connects landowners with farmers seeking land. The farm operations involved with these matches include meat, vegetables, and crops.
- **Catskills FarmLink –** Maintains the regional working agricultural landscape by connecting farmers with underutilized land.
- **Your local FSA office:** Request a list of inventory properties, if they have a land inventory it would include properties that are inventoried as delinquent loans and are offered through a process similar to an auction. Farm operators report rental rates to the USDA Farm Service Agency in Seneca Co. FSA can be reached at 315-568-6346.
- **American Farmland Trust**
- **NYC Watershed Farmland Finder:** This site may be useful in finding land.
- **Hudson Valley Ag Development Corp.:** They may be able to help you find land as well. Ask for MaryAnn Johnson.
- **Mohawk – Hudson Land Conservancy**: SCORE is your destination for free business templates, e-guides, checklists, blogs, infographics, videos, tools and other helpful resources to help you start and grow your small business. Grow With Google Digital Readiness Series

Lesson 5: Food Access

OBJECTIVE

In this lesson, students will design their ideal farm or garden space on their school campus, informed by the role they wish to play as food stakeholders in their community.

Grade Level: 9-12

Length of Time: 45 mins

VOCABULARY

Greenmarkets, land access, retail, seasonal charts, wholesale

BACKGROUND INFORMATION

What is food access?

Food Access means having the ability to get good food. Good food is nutritious, high quality, affordable, and culturally relevant. The USDA describes this phenomenon: "Consumer choices about food spending and diet are likely to be influenced by the accessibility and affordability of food retailers—travel time to shopping, availability of healthy foods, and food prices. Some people and places, especially those with low income, may face greater barriers in accessing healthy and affordable food retailers, which may negatively affect diet and food security."[12]

Access to good food is a human right, yet millions of people in the US and around the world, don't have access. That is why learning about food and supporting communities by distributing good food is crucial to our local ecosystem.

A food access point is a place where you can get nutritious, high quality and affordable food. An example of a food access point is a Greenmarket/farmers market, Youthmarket, Fresh Food Box site, Wholesale Greenmarket, and community gardens. Learn more about GrowNYC's food access points here.

How does food distribution and access vary by neighborhood in New York City*?*

New York City has distinct patterns of residential concentration by race and ethnicity. Although a mix of racial groups live in some neighborhoods, each group predominates or is concentrated in many areas. According to a 2012-2016 survey, Asian and Pacific Island New Yorkers are concentrated in the Lower East Side, south Brooklyn, and throughout Queens. Black New Yorkers cluster in Central Harlem, the north Bronx, central Brooklyn, and southeast Queens. The Latinx population predominates in northern Manhattan, the Bronx, Elmhurst/Corona area, north and east Brooklyn, and parts of Staten Island. White New Yorkers predominate in Lower and Upper Manhattan, Riverdale, Staten Island, much of southern Brooklyn, and parts of west Brooklyn.[13]

To learn more in depth, check out this article.

Food use varies across race, ethnicity, and culture. Neighborhoods across NYC that have higher concentrations of specific cultures will also typically have food that is specific to that culture. For example, Sunset Park Brooklyn is home to Brooklyn's Chinatown, where you can find a large concentration of Asian grocery stores and food markets. This creates a food hub specific to the culture living in the area. Since NYC is home to many cultures, cultural food hubs where it is easier to find food of the culture concentrated in the area occur throughout the 5 boroughs.

What is the history of food markets in NYC?

Figure 7:Clam seller in Mulberry Bend, New York

In the late 1880's pushcart markets were a primary and central component of life in NYC. New York had a world-class harbor and a hub for wholesale food supplies for the entire country. New York's ethnic communities bolstered the sale of specialty fruits and vegetables, and the sheer volume of produce consumed made markets big business. Markets established a center for ethnic communities, creating a central area of common interest.

Pushcart markets surrounded indoor markets and grew on the sidewalks in neighborhoods where markets were not yet established, sometimes better than official markets in price and quality. Although pushcarts crowded congested sidewalks, most urban neighborhoods depended on them for much of their shopping.

In 1912, The Pushcart Commissions recommended establishing wholesale terminal markets for each borough. In 1917, a Department of Markets was created to operate and supervise the city's wholesale markets: The Bronx Market, Brooklyn's Wallabout Market, and in Manhattan, the West Washington, Gansevoort Meat and Fulton Fish Markets.

By 1923 the pushcarts and peddlers were organized into about 50 open-air markets throughout the city, and by 1933 about 15,000 peddlers were recognized and licensed. Mayor LaGuardia abolished the open-air markets in the 1930's and used federal funds to build indoor retail markets, such as the one on Essex Street. Mayor LaGuardia banned all pushcarts (except licensed, food-to-eat vendors) in 1938. The reasoning at the time was that the mayor wanted peddlers to be "merchants" and established strict rules and codes of conduct for merchants.

According to the City Food Research Group, fifteen thousand peddlers had lined the streets when Mayor LaGuardia took office. By 1941, their eradication was virtually complete. The business community with support from the mayor had all but removed push carts but now experienced a lack of trade and commerce. The merchants on Orchard Street had found that "the removal of the pushcarts… has reduced gross sales… approximately 60 percent….".

However, the indoor markets created under that administration did not flourish overnight. Stall rentals were too high, customers found bodegas and supermarkets more convenient, and refrigeration reduced the need for daily shopping. With these new changes it was more difficult for small scale farmers to compete with large scale commercial farms and businesses, causing a lack of fresh and decent food in the city. This prompted the creation of several prominent independent markets that still live on today such the Bronx Hunts Point Market (established in 1967), and the Union Square Greenmarket (established in 1976). To learn more about pushcarts look here. To learn more about the Essex Street market and other markets, click here.

What are GrowNYC food access points?

Greenmarkets
Since 1976, Greenmarket has promoted regional agriculture and ensured a continuing supply of fresh, local produce for New York City. Greenmarket supports farmers and preserves farmland for the future by providing regional farmers with opportunities to sell their fruits, vegetables, and other products at our open-air farmers markets throughout New York City.

Greenmarket is GrowNYC's producer-only market with rigorous "grow-your-own" standards for the regional producers who participate in the program. Selling directly to customers means farmers, fishers and their children can keep doing what they love and feeding growing cities. It also means you have access to the primary farmers and can get to know who grows your food. Greenmarket's farmers and fishers are local producers who come from a broad section of the Northeast, including parts of New Jersey, Pennsylvania, New York, and New England, providing New Yorkers with a diverse array of fresh foods.

Farmstands
GrowNYC's Farmstand is a network of retail food access sites operated by GrowNYC, supplied with local food transparently sourced by GrowNYC Wholesale and designed to bring fresh fruits and vegetables to communities throughout New York City. Modeled after Greenmarket, Farmstand is a unique solution to food access in New York City; GrowNYC Wholesale program purchases produce from local farmers and trains young people to operate a farmstand in neighborhoods across NYC as their own small business. Through Farmstand, families in NYC have increased access to farm fresh food; youth in these areas have earned money and learned small-business skills; and farmers in the Northeast region are achieving higher revenue through access to under-served markets. GrowNYC Farmstands were formerly known as Youthmarkets.

GrowNYC Wholesale
GrowNYC Wholesale Program is a wholesale distribution service, designed to support local farmers while making their fresh, healthy, high-quality products available to all New Yorkers. GrowNYC Wholesale purchases products from local farmers, aggregates these products in our warehouse in the South Bronx, and delivers to wholesale buyers throughout the city. This system allows farmers to set a fair price for their products, and makes affordable, source-verified local foods available throughout the city. By providing these services, GrowNYC Wholesale creates profitable opportunities for farms in our region and provides more New Yorkers with access to their products.

What is the difference between wholesale and retail?
The wholesale model involves selling your product in bulk to various retailers, third-party distributors for sale to the final consumer, whereas a retail model involves selling directly to the customer. Wholesale supports large scale operations, allowing for buyers to pay a lower cost per unit versus in a retail model, where the buyer pays a higher price. Wholesale models allow for buyers to offer more affordable prices, connect with a larger audience, and distinguish themselves from smaller operations. Retail models allow for buyers to offer market value items directly to the consumer, flexibility in sale and marketing which allows for more opportunities in upselling items.[14]

PROCEDURE

1. Prior to beginning this activity, if you completed lessons 1 to 3 in this curriculum, please review the food system map (lesson 1), the farm brainstorm (lesson 2), and the asset map (lesson 3).
2. Now students will begin designing their garden or farm project that will eventually generate produce for their food access business. If you are starting from scratch with no existing garden or farm space on your school campus, begin this activity by identifying the land or space you have access to for growing your food:
    - Where do you plan to set up the farm or Garden?
    - Are there any limitations or restrictions of that space?
    - Using this information as well as that from previous lessons (see paragraph above) to help you identify what type of farming will best meet the food access needs of your community.
3. If you are using an existing garden or farm space, begin this activity by brainstorming the following questions:
    - How can you improve the garden? Think about accessibility, organization, efficiency, community relations etc.
    - What are some additional structures or components that would support the community? i.e., Hang out shed, tire swing or beautification projects
4. Have students split up into groups, to design either a new garden or to improve their existing garden space. Students can make a variety of different kinds of maps, from simply drawn gardens on construction paper to graphic designed garden maps.
    - The garden can be either indoor or outdoor, or both.
    - Include justifications for the placement of the garden, any structures built etc.

EXTENSION

- New York City has released Food Forward NYC: A 10 Year Policy Plan, a sweeping overview of goals, strategies and operational considerations to ensure that the city is building an equitable, sustainable and healthy food system for all New Yorkers. Covid-19 helped shine a light and expose the fragility of our food system, the exploitation of essential food system workers and the daily food insecurity faced by so many. The food system plan has 5 overarching goals: food access for all New Yorkers, worker protection, good jobs and economic opportunities; modern, efficient infrastructure and supply chains; sustainability from production to disposal; and education, communication and administrative support to implement the plan.
    - Review the policy plan and outline how you think this policy will impact your community. How could the policy improve to better address food access and support the local sustainable food system. OR do a role playing activity: Imagine the 10 years are up, and you've been hired as a food policy consultant for the city. How would you design the next 10-year plan?
- Watch the student made documentary, Bodega Down Bronx, made by NYC students with help from the Center for Urban Pedagogy.
- Create a timeline to visually represent the history and evolutions of markets in NYC.

Lesson 6: Food Sovereignty and Agroecology

OBJECTIVE

In this lesson, students will explore the nuances of the global food movement through concepts like food sovereignty, agroecology, food forests and Indigenous forest gardens, peasant farming the peasant food web, and community-centered farms.

Grade Level: 9-12

Length of Time: 45 mins

VOCABULARY

Agroecology, community-centered farming, food sovereignty, forest gardens, Indigenous food forests, peasant farming

BACKGROUND INFORMATION

What is food sovereignty and agroecology?

The work and concepts highlighted in this curriculum are centered around a primary goal of helping New Yorkers reach food sovereignty. Food sovereignty is a food system that is culturally responsive and operated in the community and by the community that is consuming the food. This means that food is being grown by community members and distributed directly to other members of that same community.

Agroecology is an umbrella term to describe a mutually beneficial and fruitful dynamic created between the elements at play within a food system.

According to Cooperative Climate Futures (CCF), a research group based out of The New School's Environmental Policy and Sustainable Management program, "Agroecology centers the regeneration of the land while providing food, medicine, and other community needs. It is simultaneously focused on biodiversity and cultural diversity, as the two are inextricably linked. There are a vast range of agroecology projects, as each are localized to the needs of their community, human, water, animal, plant, and geological communities included. Agroecology is the opposite of industrial agriculture. It is a holistic land-based approach to farming practices, knowledge that has been produced and conserved by peasant, Indigenous, and small-scale family farmers around the world…Despite the industrial food web using up the most resources and producing the most emissions, they only actually produce ~30% of the world's food. Indigenous and peasant communities keep the world fed sustainably by only using a fraction of the resources to produce ~70% of the world's food."[15]

The main concepts that fall under the agroecology umbrella include:

1. The food sovereignty movement
2. Food forests and Indigenous Forest gardens
3. Peasant farming and the peasant food web
4. Community-centered farms

Each category will be described below, and used as a case study in this lesson's activity:

1. The Food Sovereignty Movement

La Via Campesina, a global food justice and peasant's rights organization describes food sovereignty as follows: "Food Sovereignty offers itself as a process of building social movements and empowering peoples to organize their societies in ways that transcend the neoliberal vision of a world of commodities, markets, and selfish economic actors. There is no one-size-fits-all solution to the myriad of complex problems we face in today's world. Instead, Food Sovereignty is a process that adapts to the people and places where it is put in practice. Food Sovereignty means solidarity,

not competition, and building a fairer world from the bottom up... The concept of Food Sovereignty was developed by the people most threatened by the processes of the consolidation of power in food and agricultural systems, peasant farmers. Instead of being destroyed by the forces of history they are offering a proposal to solve the multiple crises which humanity is facing." - La Via Campesina

Food sovereignty supports the idea that all people have the right to food and the right to shape their food system. The goal of food sovereignty is to empower communities to reach self-sustainability, meaning, it helps them thrive more independently so that community members don't solely rely on larger systems for the resources they need. Food sovereignty is the opposite of the capitalist food regime and industrial food production.

In 2007, food sovereignty stakeholders gathered at the Nyéléni Forum for Food Sovereignty in Selingue, Mali, where they established the 'Six Pillars of Food Sovereignty' which include:

1. Focuses on food for people
2. Values food providers
3. Localizes food systems
4. Puts control locally
5. Builds knowledge and skills
6. Works with nature

Detailed descriptions of each pillar can be found here.

Watch this video to learn more about food sovereignty, produced by NowThis Earth.
As mentioned in the video, food sovereignty is typically organized around small-scale farming, as opposed to large-scale farming or industrial agriculture.

Example: *Soul Fire Farm*
From their website: "Our food sovereignty programs reach over 10,000 people each year, including farmer training for Black and Brown growers, reparations and land return initiatives for northeast farmers, food justice workshops for urban youth, home gardens for city-dwellers living under food apartheid, doorstep harvest delivery for food insecure households, and systems and policy education for public decision-makers." - Soul Fire Farm.

2. **Indigenous Food Forests and Food Gardens**

Indigenous Food Forests and Forest Gardens are a culturally based food system practice some Indigenous peoples around the world have nourished and sustained since time immemorial. Indigenous communities are diverse and complex, comprising more than 4,000 languages and cultures, and have equally diverse practices when it comes to the development and maintenance of their food systems.

Figure 8: Food Forest in Maui, Hawaii

Forest farming is a practice of growing, maintaining, and utilizing forested areas for producing and harvesting crops for culinary, medical, and cultural uses, which in turn provide sustenance, shelter in a sustainable and regenerative way. Food forests differ from traditional agriculture as they regenerate the landscape and add biodiversity through perennial planting. Over the last 300 years, settler agricultural practices utilized by industrial farms today have removed up to 70% of the perennial landscape that covered this continent.[16]

Food forests do the opposite. Comprising hundreds of species of trees, shrubs, and groundcover, they restore ecosystems by capturing carbon from the atmosphere and providing habitat for biodiversity and sustenance for Indigenous peoples. One example of the fight to preserve Indigenous food forests and forest gardens is by the Sengwer people in so-called Kenya. Watch this video on the Sengwer people who steward Indigenous Forest gardens being displaced by the Kenya Forest Service despite the critical, symbiotic role the community plays in maintaining forest health.

Another example of an organization working to restore Mayan food forest practices is IMAP, or Instituto Mesoamericano de Permacultura (Mesoamerican Permaculture Institute). They are a training ground and seed bank in Guatemala. Learn more about their campaign for farmers to save seeds and thereby biodiversity in this video.

3. **Peasant Farming and the Peasant Food Web**

Peasants are usually considered small scale farmers, often women led families, who live off of the land either through farming, fishing, livestock keeping, or other food ways. While peasants may be classified socio-economically living in poverty, peasants often have more power over their own food system which means they are often less at risk from being exploited in our capitalist system. Exploitation of low-income people is closely tied with the need for income to meet basic needs, like food. If you are in control of your source of food, in this case by growing it yourself in your community, you are less reliant on the mainstream economy and external income sources. Thus, peasants can often lie outside of the capitalist system because they grow food for their community. In fact, roughly 4.5 - 5.5 billion people in the world depend on the Peasant communities for their food, that's about 70% of the world's population.[17]

Figure 9: Peasant Farming in Lower Nyando, Kenya

Globally, peasants are responsible for maintaining crop diversity historically: “Peasants are safeguards for agrobiodiversity, biocultural diversity, and traditional agricultural knowledge that fosters a relationship of reciprocity, with the land, water, soils, non-human kin, and microbial diversity. Peasants also care for seeds, contributing to global seed diversity by protecting and sometimes interbreeding 50,00 - 60,000 wild relatives of cultivated species at no cost.” - https://ccfutures.co/Food

Case study: Watch this video!

4. **Community-Centered Farms**

Naturally, community centered farms are farms that first and foremost center the needs of the communities in which they are composed of. There are many ways this can manifest and community needs across different communities can vary greatly. These initiatives often overlap with the systems of farming listed above. Community centered farms often incorporate a CSA - Community Supported Agriculture program, where community members promise payment to farmers in exchange for a portion of their production all season long; this form of exchange helps minimize risk for farmers and helps local communities access fresh nourishing food over a long period of time. Many farms have also moved to a sliding scale payment option for their CSAs allowing more people to access nourishing foods grown in their community. Another program many community-centered farms incorporate is training and community engagement programs.

An example of a community centered farm in New York City is Red Hook Farms. They are a youth-centered urban farm and food justice program in Red Hook, Brooklyn. They incorporate a CSA along with teen farm apprenticeships, farmstands, and school workshops to “transform vacant lands into vibrant urban farms, improve access to healthy, affordable produce, and nurture a new generation of green leaders.”

Figure 10: Youth participating in the Redhook Initiative

PROCEDURE

1. Break the students up into 4 groups, with the following group assignments:
    - Group 1: The food sovereignty movement
    - Group 2: Indigenous Food Forests and Forest Gardens
    - Group 3: Peasant Farming and the Peasant Food Web
    - Group 4: Community-Centered Farms
2. Give students the background information readings for their respective sections. Each section is on its own page above, so print out several copies of the 4 sections above (single sided, not double sided) to pass out, giving each group the background information corresponding with their respective topic.
3. Have students read their background information and have a discussion with their group on what they learned and what they found interesting.
4. Now, ask students to research specific examples of groups doing work within their topic and related to food sovereignty (try to get examples local to NYC or the region). Some research prompts include:
    - What is the group's goal?
    - Who are they and who are the communities impacting?
    - How are they addressing food sovereignty?
    - What distinguishes your topic from the others?
    - What are some other ideas they could implement to make their movement stronger?
    - Do you feel personally connected or identified with any specific group?
5. Have the groups share out on what they learned and why their topic is an important component of food sovereignty and agroecology.

EXTENSION

- Learn about farming history and your ancestry by talking to your family. Find out if anyone in your family has experience farming or gardening. What stories can they share about this, and what did they grow?
- Think about what you and your family like to eat. Bring in a family recipe and make a list of ingredients from the recipe that could be grown in your school garden (if you can't think of any, try a different recipe). Research the ingredients you've selected (mainly vegetables or herbs) to determine whether they can be grown in the NYC climate, when they should be planted, and any notes about caring for the crops.
- As a class, watch the movie "Gather".
- Resource: What's on Your Plate?

Lesson 7: Food, Farming, and Racial Justice

OBJECTIVE

In this lesson, students will explore contributions made by Black and Brown activists, agriculturalists, and inventors to contextualize the modern day food system and food justice movements.

Grade Level: 9-12

Length of Time: 45 mins

BACKGROUND INFORMATION

What are some of the contributions Africans have made to farming and food?

The story of farming for African people can be traced back to the beginning of time. We'll start our exploration in Ancient Egypt, transporting us to the realm of agricultural advancement. Canals and waterway systems which utilized the Nile River, clay roads and cities that thrived on the water, inventions and intentions were woven into Egyptian style farming. Egyptians handcrafted fine luxury items from bronze, ivory, gold, and terracotta for both local and trade use. From there we see farming start to take shape and continue to be used for spiritual practices and more than often as a form of social status.

By the 15th century, African farmers were domesticating wild forms of rice and herbs, hunting and drying meat and so much more. They were especially skilled in medicine, mathematics, and astronomy. Art, science, and technology flourished in addition to the creation of various domestic goods. West Africans traded with Europeans through merchants in North Africa for centuries. The first traders to sail down the West African coast were the Portuguese in the 15th century. Then Dutch, British, French and Scandinavians followed. Traders were interested in precious items such as gold, ivory, and spices, particularly pepper.

Following their first contact, European traders kidnapped and brought Africans to be sold in Europe. Before that time period, slavery had already been adopted by a number of other civilizations including the Egyptians and Mayans. Slavery or servitude was often issued upon someone to clear a debt, either a financial debt or to repay a debt for a family member, friend, or spouse. While by no means, was the process enjoyable; the mass degradation that is attached to slavery wouldn't be seen until it's mass introduction in the 17th century. Specifically, African farmers were sought after, for their experience in agricultural development and for the main purposes of increasing industry and access to better food in the Americas. White plantation owners clamored for more slaves to satisfy the increasing demand for sugar in Europe, and to develop industry in the Americas bringing about the transatlantic slave trade era. To explore a visual timeline of Africa before the Transatlantic slave trade, click here.

While slavery is a part of the conversation, it is neither the beginning nor the end of it. Black advancement would continue spurring a series of agricultural inventions including the seed planter; cotton gin, refrigeration, introducing the idea of CSA's and more. In this lesson, we'll explore how through different periods of time, Black people have successfully impacted agriculture and the world.

EGYPT (BCE)

Farming has existed since the beginning of humanity; one example of an early farming community were Egyptian farmers. Egyptian farmers believed that the Nile River provided for them; evidenced by the fact that the river would flood over every year and deposit nutrient rich soil on the land. The river made it the ideal environment to grow their crops. Some of the main crops grown in ancient

Egypt were flax, barley, wheat, figs, cabbage, lettuce, and pomegranates. The most dominant crops grown were grain and barley since they were used primarily to make beer. Flax was also grown so that farmers could produce linen.

Egyptian culture depended heavily on the Nile River and even developed folk lore surrounding the god and the river. Osiris, also known as the Egyptian Lord of the Underworld; the Lord of Love, King of the Living and Eternal Lord was often depicted with black or green skin symbolizing the fertile mud of the Nile and regeneration. When the river would flood, farmers would fish for food or eat other livestock they cared for like, geese, pigs, goats, oxen, ducks, and cows. Farmers also used the flooding to keep certain areas well saturated and prevent fields from drying out under the sun. Farming was not only a task but ingrained in their way of life, from the evolution of the heavy and light ox-drawn plow to their intricate irrigation system. Irrigation canals were used to carry water to outlying farms and villages as well as to maintain crops near the river. These canals are the foundation for modern day irrigation practices used in the 20th century. To learn more about Osiris, click here.

Figure 12: Image A

Figure 11: Image B

Image A: From the grave of Menna, the agricultural scribe of the Pharaoh. Scene: Threshing of grain. c. 1422-1411 BCE

Image B: Depiction of a Farmer using the ox-drawn plow while the farmer behind him sows seeds.

RESISTANCE TO COLONIZATION AND ENSLAVEMENT

"According to in-depth research conducted by Judith Carney, a rice historian and geography professor at the University of California, Los Angeles, revelations indicate that some enslaved people were fully prepared to be captured or had enough time to store the grains on their body before being kidnapped and forced from their homes. In her book Black Rice, Professor Judith A. Carney gives a full account of the dark and hard grained rice that came from West Africa and how enslaved farmers taught their white captors how to grow and preserve it years before rice from Asia became a preferred option. Black Rice tells the story of the true provenance of rice in the Americas. It establishes, through agricultural and historical evidence, the vital significance of rice in West African society for a millennium before Europeans arrived and the slave trade began."[18]

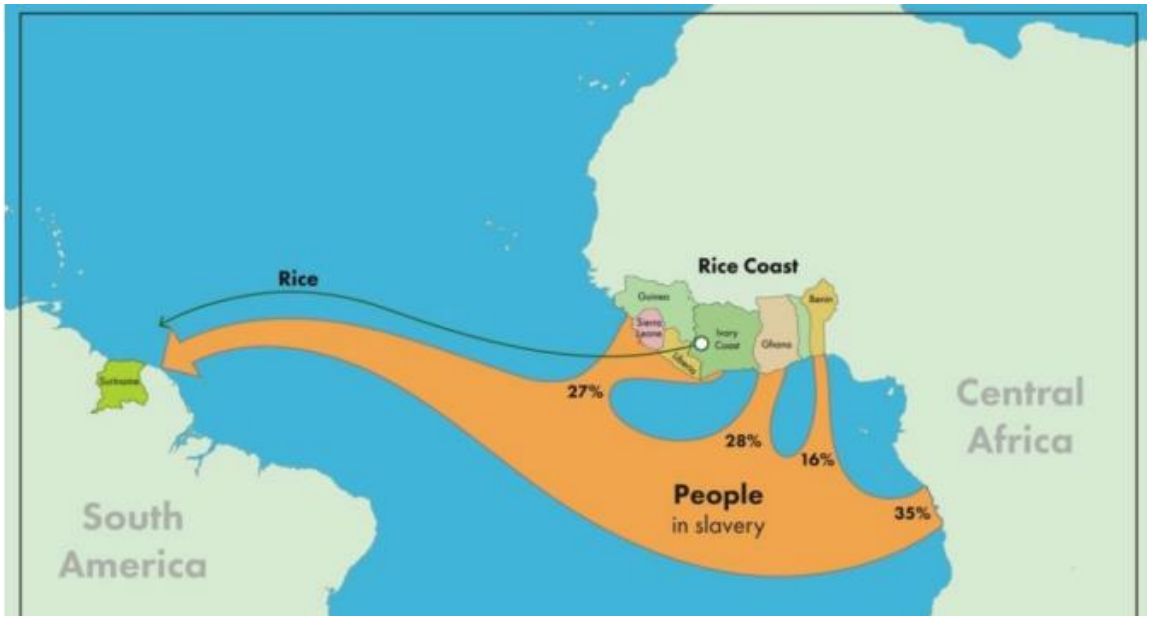


Figure 13: Map of Slave the Transatlantic Slave Trade

Few people identify slavery with the cultivation of rice, yet rice was a major plantation crop during the first three centuries of settlement in the Americas. Rice accompanied African enslaved people across the Middle Passage throughout the New World to Brazil, the Caribbean, and the southern United States. By the middle of the eighteenth century, rice plantations in South Carolina and the Black enslaved farmers who worked them had created one of the most profitable economies in the world. Unfortunately, it is a commonly held belief that Europeans introduced rice to West Africa and then brought the knowledge of its cultivation to the Americas. Not only is that assessment incorrect but it also operates to undermine the origins and cultivation of rice. Africans and African American enslaved people were transferring the seeds, the cultivation of skills, agricultural advancement, and the cultural practices necessary for growing those crops in the New World.

Professor Carney's book, *Black Rice* tells the story of African women braiding their hair and hiding rice seeds as well as other grains in their cornrows. Mothers often braided the rice into their children's hair, ensuring survival if they were enslaved or escaping from raided communities in Africa. Other crops saved were black eyed beans, small cassava cuttings, maize and other grains


Figure 14:How Enslaved Africans Braided Seeds into their Hair

depending on how thick the hair was. During the years of several slavery rebellions in the Caribbean, this practice was taken up by African Maroons farmers who escaped plantations to start their own settlements where they grew food and lived independently. To explore more African braiding styles click here, and to watch a video on black hair click here.

GEORGE WASHINGTON CARVER: SCIENTIST, FARMER, TEACHER, AND CIVIL RIGHTS ACTIVIST

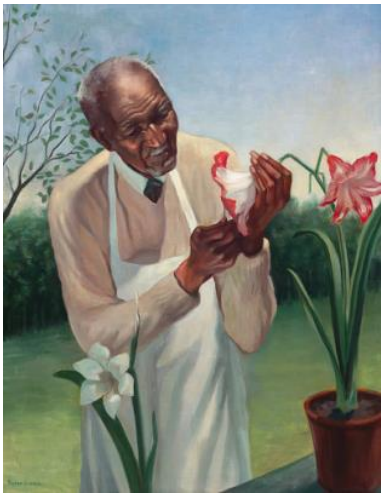


Figure 15: George Washington Carver

George Washington Carver was an agricultural scientist and inventor who developed hundreds of products using peanuts, sweet potatoes, and soybeans (unfortunately he did not invent peanut butter). George was born in 1864, a year after slavery was outlawed. He was young when he and his family were kidnapped. He was later retrieved by the owner of the plantation he was born on and raised by the owner and his wife.

At a young age, George had an interest in plants and experimented with natural pesticides, fungicides, soil conditioners and soil amendments. He became known as the plant doctor to local farmers because of his ability to improve the health of their gardens, fields, and orchards. He would later leave the plantation and study agriculture at various high schools, constantly traveling through the Midwest and using his knowledge of agriculture and housework for room and board. George initially studied art and piano in hopes of earning a teaching degree, but one of his professors encouraged him to apply to the Iowa State Agricultural School (now Iowa State University) to study botany.

In 1896, George Washington Carver received his Master of Agriculture degree and immediately received several offers, including one from Booker T. Washington of Tuskegee Institute (now Tuskegee University) in Alabama. Carver convinced the University's trustees to establish an agricultural school, with the stipulation that Tuskegee was to keep its all-Black faculty if he taught there. He would later accept the offer and would work at Tuskegee Institute for the rest of his life.[19]

Some of George Washington Carver's greatest inventions included:

- Feeding acorns to hogs (animal husbandry) instead of commercial feed
- Use of natural fertilizers such as swamp muck etc.
- Crop rotation techniques
- Jessup wagon (mobile classroom and laboratory to demonstrate soil chemistry)
- Flour (from sweet potatoes)
- Vinegar (from sweet potatoes)
- Stains, dyes, paints and writing ink
- More than 300 food items, industrial and commercial products from peanuts, including milk, Worcestershire sauce, punches, cooking oils and salad oil, paper, cosmetics, soaps and wood stains. He also experimented with peanut-based medicines, such as antiseptics, laxatives, and goiter medications.

Through his work George Washington Carver provided farmers with the agency and education that they needed to prosper! Check out the George Washington Carver National Monument here.

FANNIE LOU HAMER: CIVIL & VOTING RIGHTS ACTIVIST, SINGER, FARMER, AND COMMUNITY ORGANIZER

Figure 16: Fanny Lou Hamer

Fannie Lou Hamer was born in 1917, to Lou Ella and James Lee Townsend, sharecroppers east of the Mississippi Delta. She first joined her family in the cotton fields at the age of six, forced to pick hundreds of pounds of cotton a day. She managed to complete several years of school, learning how to read and write, a skill that would support her later in her life. Sharecropping was a system where an owner and a tenant farmer entered into an agreement; land usage to grow crops in exchange for a portion of the harvest as well as room and board. This forced tenant farmers to work to produce the largest harvest that they could, to have enough for themselves and the portion owed to the owner. These predatory practices ensured that tenant farmers stayed tied to the land, in debt, and made it unlikely for them to leave for other opportunities.

In the early 1940s Fannie married Perry (Pap) Hamer and worked alongside him at W.D. Marlow's plantation near Ruleville, in Sunflower County. After suffering from intentional medical malpractice, and unable to have children of their own - the Hamer's adopted two children. In the 1960's Fannie's influential career as a civil and voting rights activist took off. From supporting Black voters in South Carolina, to sit-in protests at white only restaurants, and later on as the co-founder of the Mississippi Democratic Party. From 1964 - 1968, Hamer would go on to support more legislative change, as well as being an inspiration for the Civil Rights Movement with her song, This Little Light of Mine. Fannie Lou Hamer's Congressional testimony was so powerful that President Johnson called an impromptu press conference to get her off the air. But his plan backfires, check out the video here.

In 1969, Hamer founded the Freedom Farm Cooperative with a $10,000 donation from a charitable organization. They purchased 40 acres to empower poor Black farmers and sharecroppers, who had been at the mercy of the local white landowners. "The time has come now when we are going to have to get what we need ourselves. We may get a little help here and there, but in the main we're going to have to do it ourselves." The Freedom Farm was dedicated to grassroots participation, liberation, and economic sovereignty for Black farmers. "All the qualifications that you have to have to become part of the co-op is you have to be poor. This is the first kind of program that has ever been sponsored in the country in letting local people do their thing themselves."[20]

In 1970, the co-op purchased an additional 640 acres for cultivation. The organization also started a pig bank. With funds from the National Council of Negro Women, the co-op bought 35 female pigs and five boars. Over the next three years, the pig bank produced thousands of new pigs to feed

impoverished families. The other purpose of the pig bank was to provide farmers with the collateral to purchase more land, resources and to increase the property value of their farms. Unfortunately, the farm was not able to sustain itself and was forced to dissolve due to lack of institutional backing, and lack of additional commercial ventures to keep the project afloat. To learn more, click here.

BLACK FARMERS IN THE SOUTH

Figure 17: Farmer ploughing land

Throughout American History African American farmers have suffered trials of discrimination and racist policy that have made it difficult to obtain, keep, and work farmland.

Discriminatory practices ranged from predatory lending and high interest rates from Banks, unjust conditions and policies in factories, USDA, and the exclusion from government programs like the American Homestead Act and GI Bill. There were instances where the U.S. government pledged to grant land to Black farmers, but those prospects were short lived and swiftly revoked and given to white confederates instead. One example is the famous “40 acres and a mule” promise, originally granted by William T. Sherman in 1865 to provide adequate farmland to African Americans from Charleston, South Carolina to Florida. In this order 400,000 acres of land was designated to be distributed to newly freed enslaved African Americans; support would be provided from the military. African Americans would have full agency of what happened on their land. However, Andrew Johnson would later overturn this decision, because of his sympathy for the white southern confederates, thus forcing the already established Black farmers off their land. To learn more about the truth behind 40 acres and a mule, click here.

In the 1920’s, 14% of farm owners were Black or African American, now that percentage is down to 2% due to historically unfair and racist practices. According to the NY Times “The Jim Crow era brought about a violent backlash from white landowners; Black farmers and sharecroppers became the target of their intimidation, fatal bombings, and other attacks. The discrimination and racial violence spurred many Black farmers to flee North, often to cities, as part of the Great Migration. Disparities in access to loans and aid, and well-documented discrimination at the Department of Agriculture, also drove Black farmers from their land. Even as the Civil Rights era started to bring Black Americans equal rights under the law, the rural exodus accelerated as white citizens’ councils in the South, wary of a surge in Black voters, explicitly targeted Black farmers for expulsion from their communities.” Land lost by Black farmers was an estimated 90% decline from the early 20th century, according to the Land Loss and Reparations Project, as white-owned acreage has shrunk only by 2%.[21]

RISE IN URBAN AGRICULTURE TODAY

Black steward and community gardens have been providing agency to community members with spaces like Brook Park Community in the Bronx. Offering alternatives to incarceration, canoeing in the Bronx River, access to ancestral growing practices, tire swings and more.

Figure 18: Urban Garden

Community leaders have been instrumental in supporting growers through the Small Axe initiative which pays farmers for peppers that are used to make Bronx Hot Sauce. As well as providing residents with access to green spaces and community building. A large part of the initiatives surrounding Black growing spaces involves connecting Black and Brown folks to nature and showing the healing power of the earth. To date, Black and Brown communities continue to face more facets of environmental racism such as exclusion from green spaces and lack of knowledge on healthy eating habits compared to many other racial groups. Small community spaces provide farmers with the ability to make direct impacts on their immediate community and collaborate with other gardens and farms in their communities. Black farmer collective groups and conferences including Black Urban Growers conference, also known as BUGS created by farmer and activist Karen Washington and other elite Black farmers offer community and stewardship building opportunities. There has also been an investment into the Urban Agriculture community through training youth programs like Green City Force and Red Hook Farms.

Black farmers as a collective force have been setting up farms in isolated areas of upstate NY to directly impact the food system of more New Yorkers. In addition, they have been working directly in the Tri-state area, to impact local food policy and disrupt the current food system. These policy initiatives include addressing the history of discrimination against Black farmers and ranchers, as well as calling for drastic reforms within the Department of Agriculture to prevent future discrimination. The policies would support farmers who have been victimized due to discriminatory and unfair practices, help farmers access funds easier, and provide a fund to encourage more Black and Brown farmers to connect back to the land. To learn more about the policy shaping urban farming, click here.

Growers have also been connected with mutual aid projects like Community Fridges to prevent food waste and combat food insecurity within their communities. Other waste management initiatives such as recycling programs by the Inner City Green Team and composting by BK Rot, Red Hook Farms, Compost Power etc., improve quality of life and help to combat climate change.

PROCEDURE

Time travel Letters or Drawings: Talk to your peers about your impression of the activist or time period and its impact on any agricultural and societal advancements or inventions. Explore how they may have impacted you or agricultural society.

Option 1: Group Work

1. Break the students up into 6 groups, with the following group assignments:
    - Group 1: Egypt
    - Group 2: Resistance to Colonization & Enslavement
    - Group 3: George Washington Carver
    - Group 4: Fannie Lou Hamer
    - Group 5: Black Farmers in the South
    - Group 6: Rise of Urban Agriculture Today

2. Give students background information reading. Each section is on it's own page above, so print out several copies of the 6 sections above to pass out, giving each group the background information corresponding with their respective topic.
3. Have groups identify which activist or time period they would like to explore. They will later be asked to present either a letter or drawing of that activist, historical figure, or time period that has influenced agriculture and food today, as we know it.
4. Ask students to read their page and later discuss as a group the following questions:
    - How did the person, group or time period change the agricultural industry?
    - What do you think the industry would be without that invention or societal contribution?
    - What are some ways you connect with this person, time period or invention?
    - What information is missing? What else can we learn from this contribution?

5. Write a letter or do a drawing about the topic your group explored. Draw a picture of anything that's related to them, their work, and their impact on society. Talk about some of the key takeaways and how it makes you feel. Students should be given this time to think critically about their feelings and how this topic resonates with them.

Option 2: Individual Work

1. Give students background information reading. Each section is on it's own page.
2. Have students choose which activist or time period they would like to explore. They will later be asked to hand in, either a letter or drawing of that activist, historical figure, or time period that has influenced agriculture and food today, as we know it.
3. Ask students to read their page and later discuss the following questions:
    - How did the person, group or time period change the agricultural industry?
    - What do you think the industry would be without that invention or societal contribution?
    - What are some ways you connect with this person, time period or invention?
    - What information is missing? What else can we learn from this contribution?
4. Write a letter or do a drawing about the topic you explored. Draw a picture of anything that's related to them, their work, and their impact on society. Talk about some of the key

takeaways and how it makes you feel. Students should be given this time to think critically about their feelings and how this topic resonates with them.

EXTENSION

- Watch High on the Hog on Netflix
- Watch Appetite for Change on Youtube
- Check out Ron Finley's Masterclass or his Ted Talk on Youtube
- Check out these resources on youth farming
    - Young Farmer's Coalition- NYC Chapter
    - Beginning Farmers
    - Teens for Food Justice
    - The Food Project
    - A profile of agriculture in New York state
    - The Black farmers fighting food deserts in New York
    - Growing locally: NYBG partners with new community farm hubs to tackle food insecurity close to home
    - History of farm gardens in NYC Parks
    - 6 Black owned farms and CSAs doing evolutionary work
    - Biden is Courting Black Farmers, but They're Paving Their Own Road to Justice
    - Community Food Action - New Settlement Apartments
    - Green Guerillas
    - East New York Farms
    - Local Roots NYC
- Check out these resources related to urban farming and Black farming
    - Black Farmers United
    - Sisters plant the seeds for a new generation of Black farmers: "We want people to reconnect"
    - New York State Department of Agriculture and Markets
    - 15 Urban Farms and Gardens Bringing Fresh Produce and Food Education to New Yorkers
    - Farm School NYC
    - Community gardens and urban agriculture
    - NYC Urban Agriculture
    - USDA Urban Agriculture Toolkit
    - One Urban Farm's Impact on Health and Well-Being in New York City
    - The Potential for Urban Agriculture in New York City
    - Gardening & Agriculture: New York City Gardening and Agriculture

Lesson 8: Food, Farming, and Climate Change

OBJECTIVE

In this lesson, students will learn about how climate change connects to the food system and explore how sea level rise will impact their neighborhood.

Grade Level: 9-12

Length of Time: 45 mins

VOCABULARY

Climate change, greenhouse gasses (GHGs), agroecology, renewable energy, tillage.

BACKGROUND INFORMATION

What is climate change?

Science has proven that climate change is a real and urgent threat, impacting all species and Earth systems. Some of these impacts include droughts, land damage, unlivable hot zones, stronger and more destructive natural disasters, forced mass climate migration, political instability, and intensified global health issues.

Climate change causes shifts in atmospheric conditions, temperature, water systems, and weather systems at varying degrees of intensity. Climate change is a symptom of capitalism. As an economic model, capitalism, relies on infinite growth which requires infinite resources to produce the goods that drive the economy. However, the Earth does not have unlimited resources. Our capitalist economic model extracts resources from the Earth at unsustainable rates in an attempt to keep up.

Greenhouse gas (GHG) emissions lead to the increased global temperatures associated with climate change. The most significant GHG is carbon dioxide. Climate scientists associate climate change with the exponential increase of carbon dioxide in the atmosphere that happened around the time of the Industrial Revolution. The Industrial Revolution happened in order to meet the needs of the capitalist system and infinite economic growth. Economic goods weren't being produced quickly enough to keep up with the speed of infinite growth, so we shifted to quicker, cheaper production models. The Industrial Revolution led to a boom in factories, machinery, and the automated production of goods, which is when we see spikes in carbon dioxide begin to occur. This automation was made possible by using technology that required fossil fuels to function. When combusted, fossil fuels release significant amounts of carbon dioxide into the atmosphere. Do you see the correlation? When society shifts to fit within the capitalist model of infinite economic growth, environmental degradation occurs, in this case it's due to GHG emissions, which lead to climate change. A shift in our economic system to one that is more aligned with the capacity of the Earth and its resources is an important step in addressing climate change.

Climate change is also a symptom of colonization because colonizers shifted the dynamic between humans and natural systems to an extractive relationship of power and domination. Prior to colonization, Indigenous communities lived symbiotically with the land, in mutual respect, deep tradition, and stewardship, informed by generations of knowledge. Colonizers stripped Indigenous land stewards from their homes and enforced an abusive dynamic onto the land, one that takes as much as it can from the land without holding respect for it. This also led to conceptual separation between the Earth and humans, in order to see humans as different from the Earth, making it easier to perpetuate this abuse of power over natural resources. Examining these histories helps us understand that climate change is simply a byproduct of capitalism and colonization.

Now, climate change disproportionately impacts low-income communities, Black, Indigenous, and People of Color (BIPOC) communities, seniors, and children. Climate change is directly linked to our ongoing reckoning with racism and white supremacy in the U.S., especially considering that as the impacts of climate change intensify, those who already experience systemic oppression will be further burdened by the worst effects of climate change in our current system. It is crucial to address the climate crisis for the safety and well-being of those experiencing systemic oppression. In order to address the climate crisis, we must know how it will affect us.

How will climate change impact New York City?

According to the New York City Panel on Climate Change, several climate impacts here in New York City have already unfolded. See images below, pulled from [NYC Department of Environmental Protection's Climate Change Module](), with data from the [NPCC]().

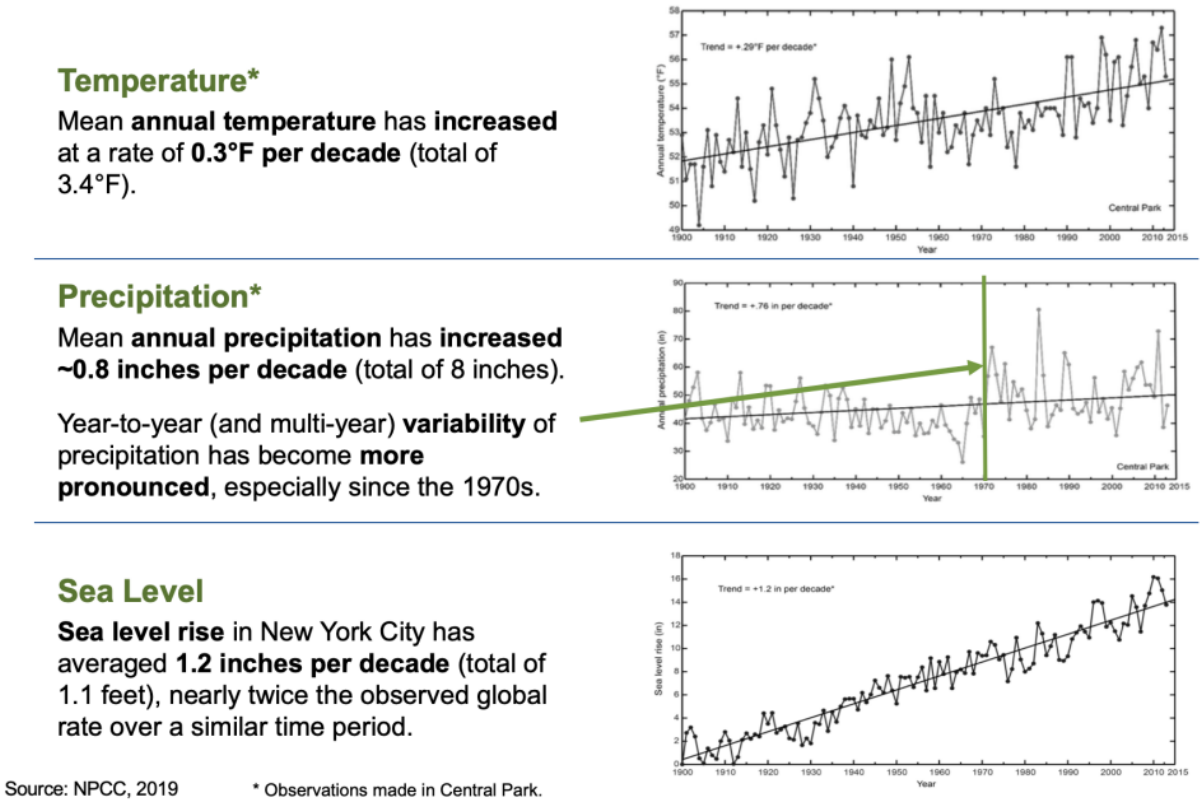


Figure 19: Impact of Climate Change in New York City

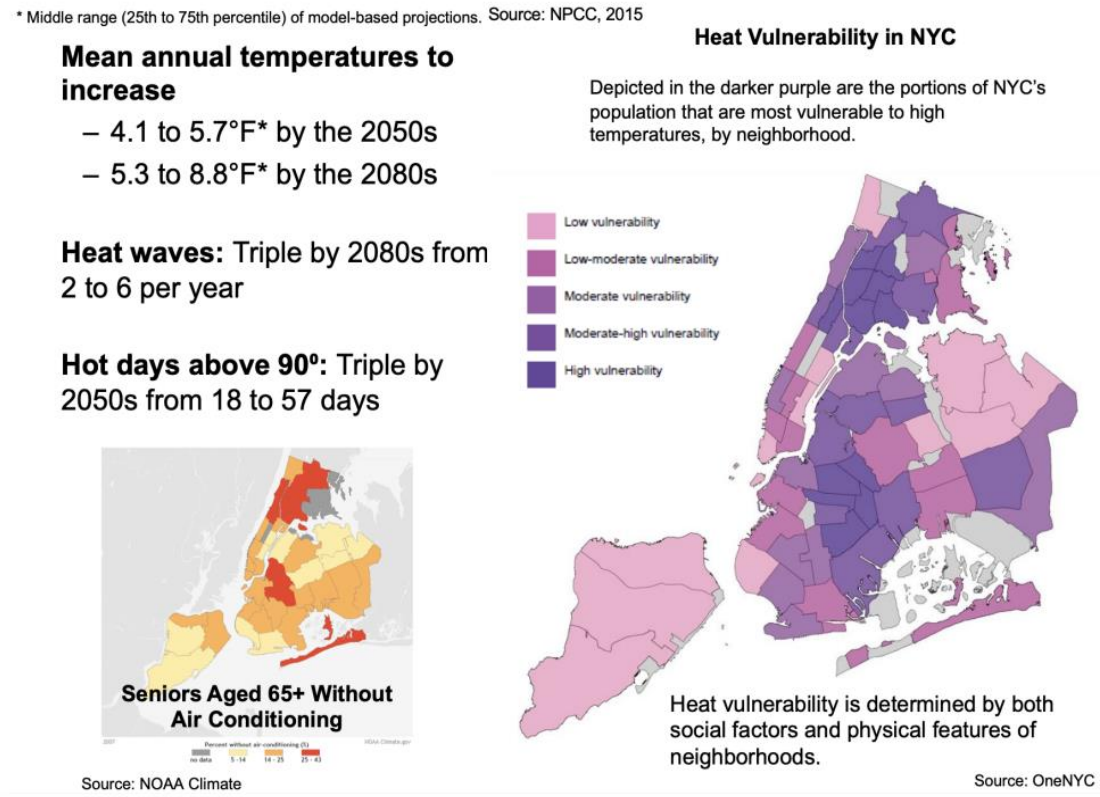
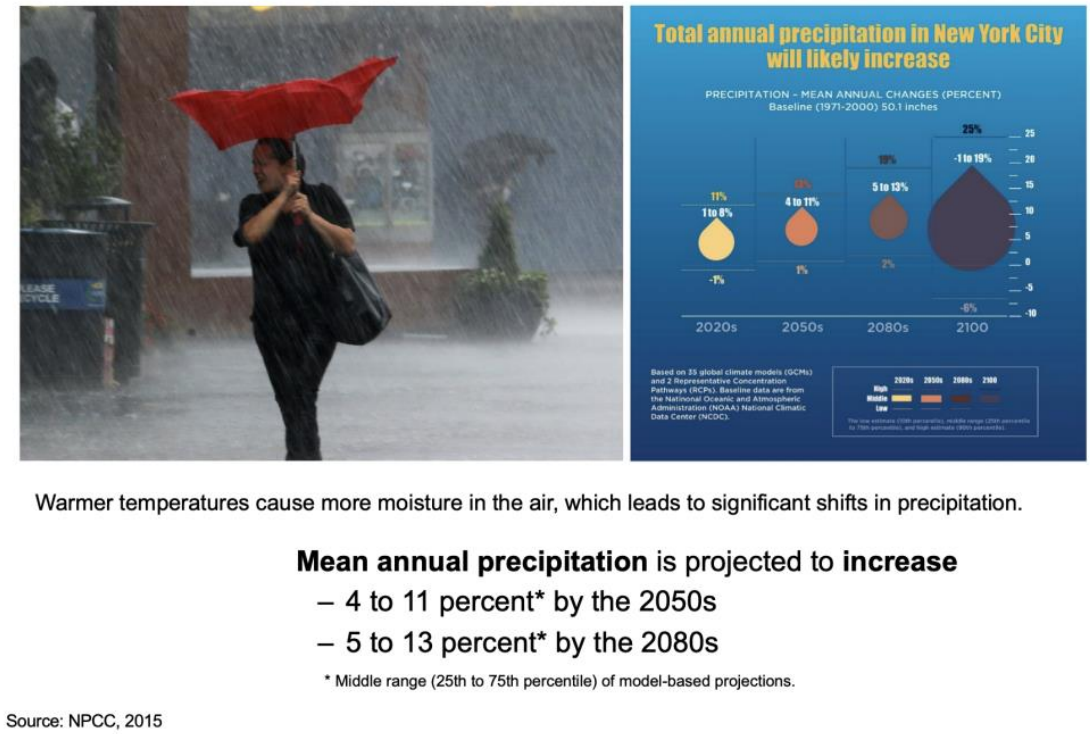


Figure 21: Impact of Climate Change in New York City



Warmer temperatures cause more moisture in the air, which leads to significant shifts in precipitation.

Mean annual precipitation is projected to **increase**

– 4 to 11 percent* by the 2050s

– 5 to 13 percent* by the 2080s

* Middle range (25th to 75th percentile) of model-based projections.

Source: NPCC, 2015

Figure 20: Impact of Climate Change in New York City

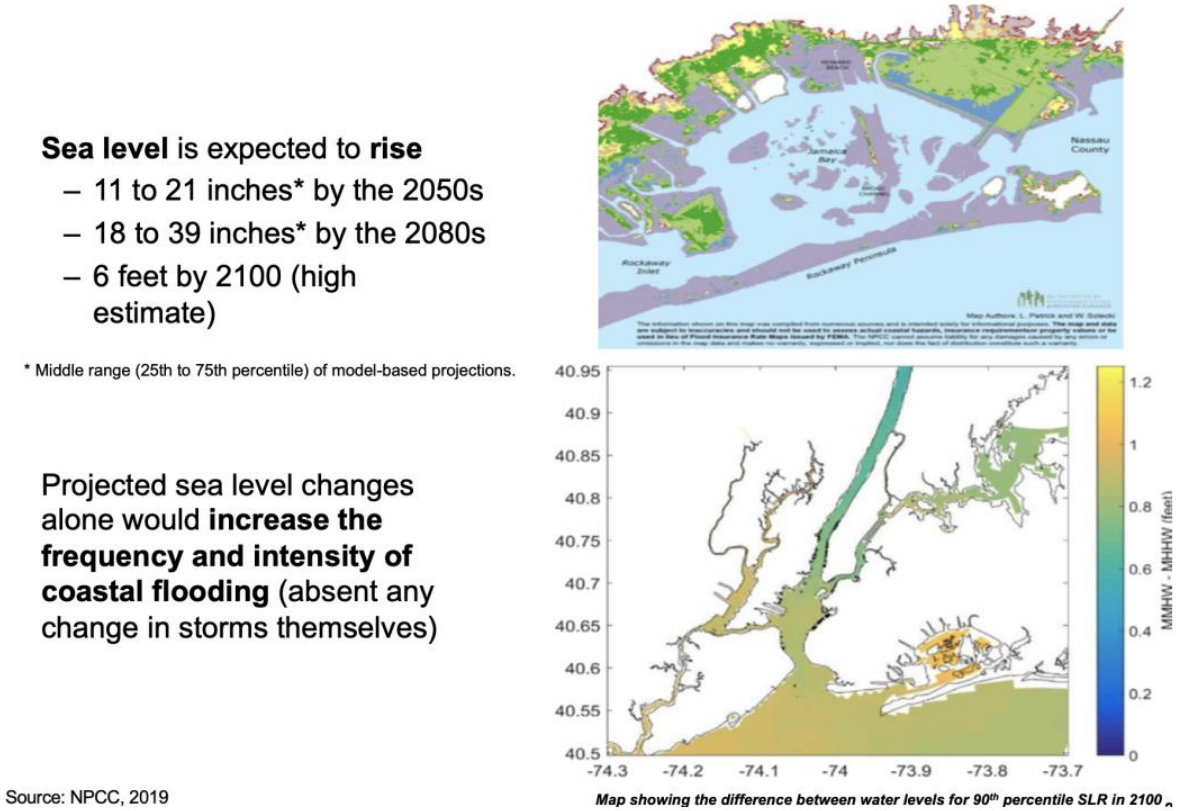


Figure 22: Impact of Climate Change in New York City

Find resources and slides about climate change and NYC in DEP's Climate Change Education Module.

How will climate change impact our food system?

According to the Climate Change, Global Food Security, and U.S. Food System Assessment Report, "climate change is likely to diminish continued progress on global food security through production disruptions leading to local availability limitations and price increases, interrupted transport conduits, and diminished food safety, among other causes. The risks are greatest for the global poor and in tropical regions. In the near term, some high latitude production export regions may benefit from changes in climate.

As part of a highly integrated global food system, consumers and producers in the United States are likely to be affected by these changes. The type and price of food imports from other regions are likely to change, as are export demands placed upon U.S. producers and the transportation, processing, and storage systems that enable global trade. Demand for food and other types of assistance may increase, as may demand for advanced technologies to manage changing conditions."[22]

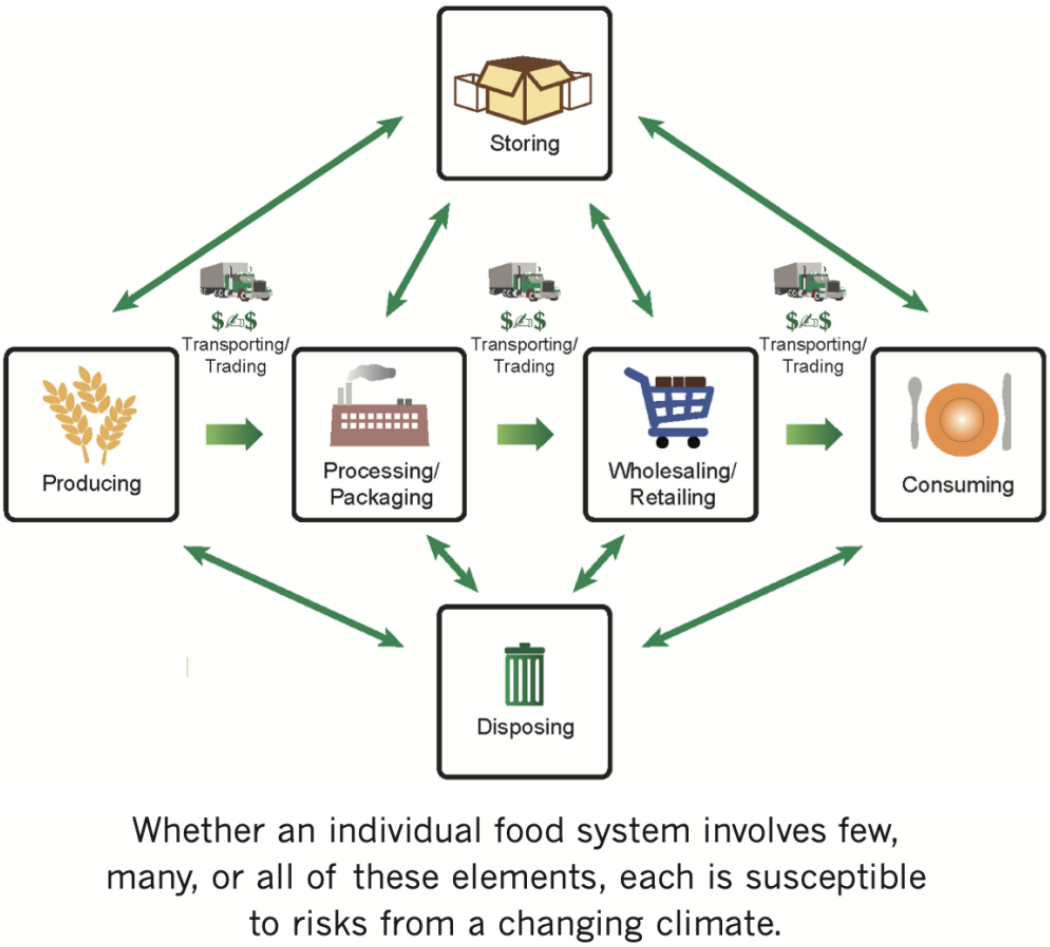


Figure 23: Effects of Climate Change on the Global Food System

"Production is affected by temperature increases; changes in the amount, timing, and intensity of precipitation; and reduced availability of water in dry areas.

Processing, packaging, and storage are very likely to be affected by temperature increases that could increase costs and spoilage. Temperature increases could also make utilization more difficult by increasing food safety risks.

Sea-level rise and precipitation changes alter river and lake levels, and extreme heat can impede waterborne, railway, and road transportation."[23]

How are farmers and gardeners responding to climate change?

As discussed, capitalism is the cause of a lot of environmental degradation, including climate change, as well as the exploitation of workers and communities experiencing systemic oppression.

For businesses, including food and farm businesses, generating profit is usually the goal. Businesses are forced to exist within a capitalist market defined by infinite growth, which means that businesses often try to expand and grow to make as much money as possible. However, some

business owners are not concerned with growing infinitely and instead prioritize running an ethical business. Socially and environmentally conscious business owners work to avoid putting profit over people and the environment. Similar to how many small-scale farmers enjoy operating small farms and do not plan to expand their farm, some business owners keep their business operations small in order to avoid harming the environment, the people working for the business, or the communities potentially impacted by the business.

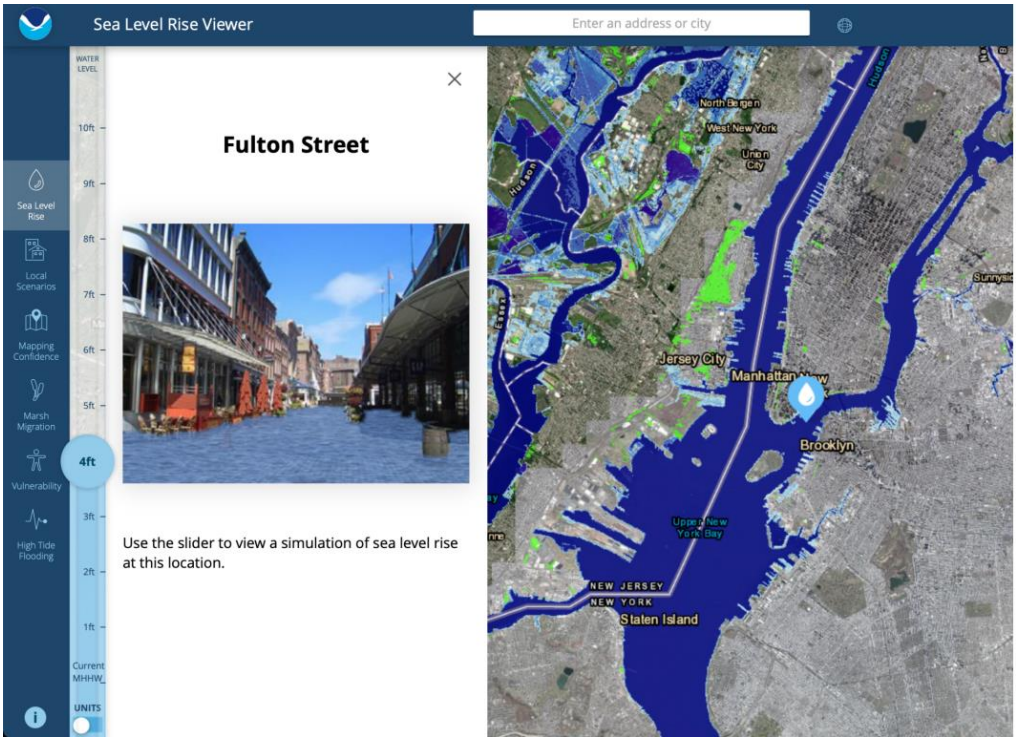
As stakeholders directly connected to the environment, climate and Earth systems, farmers will be directly impacted by climate change. There are several ways farmers, and school gardeners, are addressing climate change on their land, in order to decrease their carbon footprint and prepare for intensified climate impacts. Climate-friendly farming and gardening strategies include:

- **Agroecology** helps farmers work in unison with nature and the Earth's systems, to avoid further environmental degradation from farming practices.
- Integrating **renewable energy technology** to replace fossil fuels on the farm. This will decrease the farm's carbon emissions and make it more resilient to shifts in fossil fuel availability.
- Seed keeping offers economic and ecological benefits to farmers and their environment. Seed keeping allows for plants to complete their life cycles, increases biodiversity, preserves native species, and supports small scale farmers with free resources.
- Season extension allows farmers to adapt to changing climates while preserving crops for colder seasons. Season extension is especially important when considering food production yield, seasonal growing cycles, and food availability depending on the weather.
- Natural hybridization to create resilient seeds (as opposed to GMOs) allows farmers to naturally create more resilient crops without negative mutations. This can be as simple as leaving peppers in the soil after the frost to see what plants will continue to produce. It can also be achieved through cross pollination and hand pollination techniques on crops like squash, blueberries etc.
- Updating **irrigation systems** to save water on the farm, making the farm more resilient to drought and disruptions in the local water system. This could also include using a rainwater catchment system to water crops as opposed to using water from the tap.
- Growing **native plants** helps support local ecosystems and usually requires less inputs like water and soil amendments to grow because they naturally occur in the environment and are designed to thrive in your local ecosystem.
- With fires increasing due to climate change, **controlled burns** and other fire management/forest management strategies help decrease the chances of fires on land.
- **No-till farming** helps keep carbon dioxide in the soil, as opposed to releasing the carbon dioxide from the soil to the atmosphere where it would intensify the impacts of climate change. For reference, "Tilling the soil, also known as tillage, is the conventional way of preparing the soil for planting by digging, stirring, and turning it over. Typically, the soil is turned over with an implement to a depth of several inches or more, which usually requires two or more passes over the field. Tilling kills unwanted plants and buries mulch, leaving behind a barren soil. Conventional tilling is more time-consuming and can even lower the quality of the soil, causing soil compaction, and leading to soil erosion."[24]
- **Using fewer chemical inputs** like fertilizers and pesticides helps farmers avoid polluting local water bodies and soils, which helps conserve natural resources.

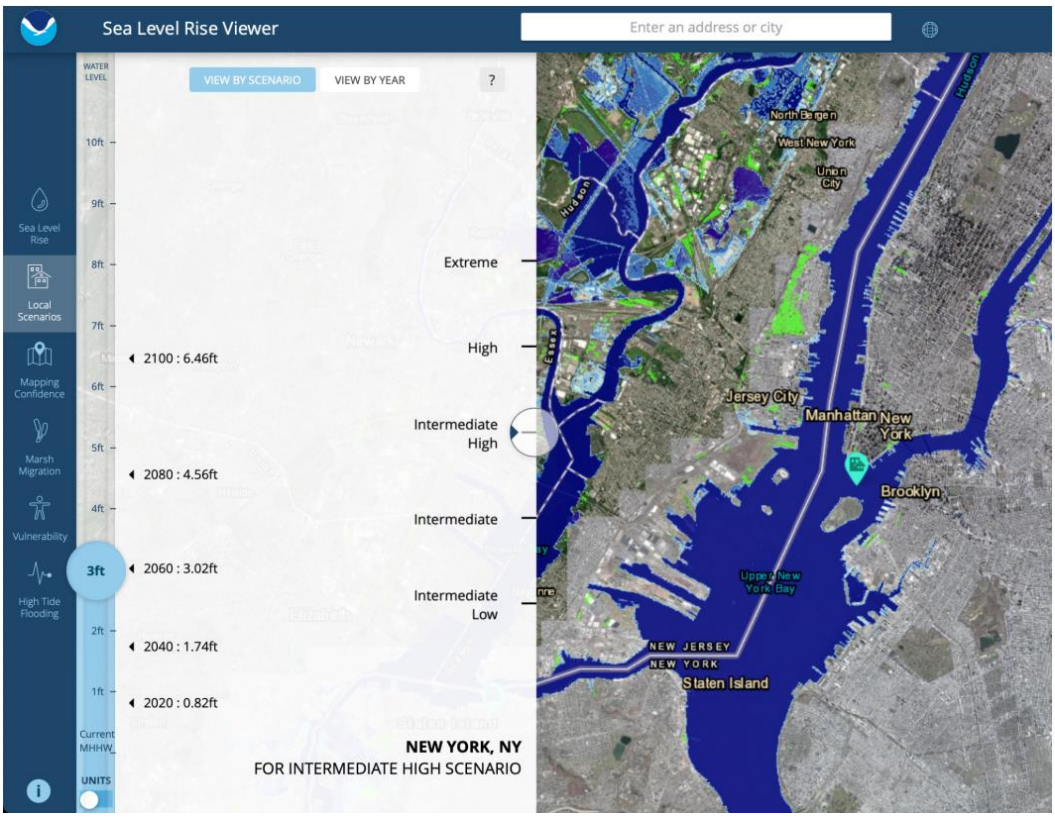
Many of these practices were used by Indigenous peoples prior to colonization. We are seeing a return to these practices, and therefore must acknowledge the fact that many of these practices are not new and were not created by White people. These strategies allow climate-friendly farms and local small-scale farms to improve the health of the environment and local ecosystems.

PROCEDURE

1. Refresh the class on your discussion about the role you'd all wish to play as local food stakeholders.
2. Discuss the background information from this lesson related to climate impacts. Make the connection between climate change and the global food system, to highlight that all of what this curriculum has discussed thus far is inevitably connected to climate change.
3. To be informed local food stakeholders, students will need to know how their farm/gardening work and their local food system will be impacted by climate change. NYC is a coastal region, which makes us especially vulnerable to sea level rise. In this lesson, students will explore the climate resiliency of their neighborhood, specifically they will explore vulnerability to sea level rise.
4. Share NOAA's Sea Level Rise Viewer with the class to visualize the potential impacts of sea level rise in their area. Click "Launch", then "Get Started", then on the map, zoom into your area. Click the "Local Scenarios" tab and toggle the "Water Level" meter on the left column to see sea level rise predictions appear on the map.
5. Click the closest area with a water droplet icon pin, to view an image that represents what sea level rise will look like in the area. For example, here you can see an image of Fulton Street in Brooklyn with 7 feet of sea level rise.



6. Then, click the "Local Scenarios" tab to see what scientists are predicting in terms of amount of feet, for example, here you can see that in 2060, Fulton Street is predicted to receive 3.02 feet of sea level rise, under the "Intermediate High" scenario.



7. Play around with the different scenarios to see how the numbers change depending on which scenario is selected.
8. Debrief this activity by discussing the following questions:
    a. Were you surprised to see how NYC will be impacted by sea level rise on this map?
    b. What was your immediate reaction when learning about how we will be impacted by climate change?
    c. What other climate impacts beyond sea level rise to you expect to see in your neighborhood?
    d. What climate impacts are you already seeing?
    e. How do you think climate change will impact your ability to grow food?
    f. How do you think climate change is impacting the global food system?
    g. How can we better prepare for climate change?
    h. Are there farming techniques you'd like to incorporate into our school garden that will help us respond to climate change?

EXTENSION

- Revisit the garden plan that students created in Lesson 5 and update it to incorporate climate-friendly farming and gardening practices. How will this new plan incorporate what you've learned about sea level rise in NYC?
- Create a proposal for your school or your local community board that outlines the ways they can better respond to local climate impacts.
- As a class, work through lessons and worksheets from NYC Department of Environmental Protection's Climate Change Education Module.

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