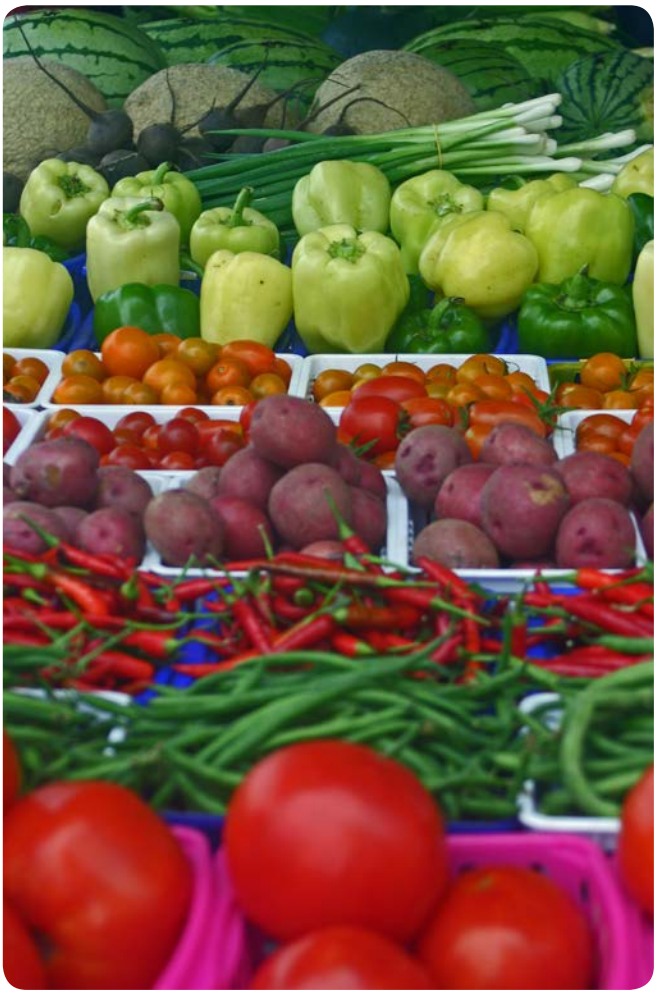

The Wisconsin Food Systems Education Conceptual Framework

A conceptual guide to food systems education in Wisconsin

Wisconsin Center for Environmental Education
College of Natural Resources
University of Wisconsin-Stevens Point

UW Extension
University of Wisconsin-Extension

2015
Wisconsin Center for Environmental Education and
the University of Wisconsin-Extension Cooperative Extension

All photos provided by Jesse Haney

The Wisconsin Food Systems Education Conceptual Framework

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A Conceptual Guide to Food Systems Education in Wisconsin

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Conceptual Framework Overview

Purpose of this Publication

A) Identify and present concepts that educators can convey to students and participants to help them understand the importance of food systems and the roles that we all play within them.

B) Guide educators, through content and sequencing, as they incorporate food systems education into their curricular activities and programs.

C) Serve as a framework and resource for food systems education efforts in other geographic locations in addition to Wisconsin.

These identified purpose statements serve to cultivate an appreciation within students for the system surrounding food, including knowledge and skills that promote informed decisions. Ultimately, this framework helps to foster lifelong interest and conscious engagement in food systems.

Framework Introduction

Food systems education in this form is a fairly new field and includes a wide array of information. Due to its breadth, the topic can be overwhelming to both understand and teach. This framework divides food systems education into organized concepts, making the subject easier to both teach and learn. We have strived to include concepts and ideas that address diverse perspectives and issues.

This Food Systems Education Conceptual Framework is not a curriculum itself. Rather, the framework provides the foundation and organizing structure through which curricula, activity guides, programs, specific lessons and other teaching materials are developed, whether that be in a pK-12 setting or a community setting. As food systems understandings evolve, along with our food systems themselves, the framework will too evolve.

Many individuals and organizations provided input in developing this conceptual framework. The Wisconsin Center for Environmental Education conducted a survey to gather information about food systems literacy and education from individuals, businesses and organizations in Wisconsin who are involved in some aspect of food systems work. The WCEE also collaborated with the UW-Extension - Cooperative Extension Community Food Systems Team to generate concept ideas and provide comments and edits on drafts of the framework. Existing conceptual frameworks, such as the K-12 Energy Education Program—A Conceptual Guide in Wisconsin and the Learning, Experiences, and Activities in Forestry (LEAF)—A Conceptual Guide to K-12 Forestry Education in Wisconsin, were used as references for the organization of this document.

In the fall of 2014, more than 25 educators from schools and communities throughout the state came together to shape the Wisconsin Food Systems Education Conceptual Framework, crafting the suggested scope and sequence section at an all day workshop. Attendees dissected the framework and aligned the concepts to the grade levels at which they should ideally be taught, while also discussing how to apply the framework in environments outside of pK-12.

A Rationale for Food Systems Education in Wisconsin

"Eating with the fullest pleasure — pleasure, that is, that does not depend on ignorance — is perhaps the profoundest enactment of our connection with the world." Wendell Berry, 1990

Human beings eat to survive. Much more than this, however, we eat to nourish our bodies and to fuel our minds. We eat to grow and develop, and to be healthy. We eat at home, at school, at work, and in the community. We eat to interact with one another and with the natural world. What we eat depends on geography, culture, policy, the economy, and a myriad of other forces. What we eat, in turn, reinforces and shapes these and other systems, helping to create the world and communities we live in. To eat with the fullest pleasure, as Berry describes, requires an understanding of the food we eat and the system in which it is embedded.

The heritage and history of agriculture in Wisconsin is often celebrated and commemorated. Recent trends, concurring with the rest of the nation, have seen a decline in the number of farms and farmers in the state. Fewer children are growing up on farms and the characteristics of those farms are changing as well. In general, youth and adults alike are much less connected to their food (sourcing, processing, cooking, meals, etc.) than they were, say, a century ago. With that said, a richness remains within Wisconsin's agriculture and food culture. Agriculture represents about $30 billion in total income (10.9 percent of state total) and about $88.3 billion to total industrial sales/revenue, there are currently about 70,000 farms in Wisconsin, and land in agricultural use covers nearly half of the land in the state.

Various community groups and educational programs have emerged in recent years with a charge to re-invigorate food awareness in Wisconsin's culture. Terms like food literacy have gained attention, coinciding with the growth of various movements associated with "re-fooding" our nation. Yet, systemic food-related issues have not disappeared and are often presented as distinct, stand-alone problems, begging the need for more work and continued effort. A holistic approach to food systems education that is founded in awareness-building rather than advocacy is necessary.

The Wisconsin Food Systems Education Conceptual Framework was created and designed to support and unite existing efforts, together boosting and growing food systems education throughout the state. Teaching about food systems is complicated and often challenging. This document is a guide for formal and nonformal educators, whether they are updating existing pK-12 curricula, creating a new curriculum, or developing community programming for food systems education. This guide enables comprehensive education about food systems, presented in a logical sequence so as to facilitate application at any educational level. The framework allows for cohesion and consistency in what is now a fundamentally essential area of education in Wisconsin.

Framework Organization

The framework is organized into four sequential themes, offered as questions: *What is a food system? Where does food come from? Why should we learn about food systems?* and *How do we support our food future?* Each theme, or question, is divided into sub-themes that consist of numbered concepts.

The themes, or questions, are arranged so that they build upon one another. Despite this organization of the themes, the concepts are not arranged in order of importance. The first theme, *What is a Food System?* introduces the definition, discusses systems, and the various components and roles involved in a food system. Secondly, *Where does food come from?* encourages critical thinking and investigation into the process involved in putting food on our tables. The third theme, *Why should we learn about our food systems?* describes how food is connected to human health and the health of the planet and includes information on how the food system interplays with and affects other systems. This section also addresses the history and evolution of the food system. *How do we support our food future?* introduces the notion of sustainability to point towards what the future may look like. This final theme also builds on the effects of the food system introduced in the third theme to identify emerging and existing issues.

Ideally, students and participants (those who engage with the framework who are not pK-12 students) will progress from a basic or minimal understanding of food systems to an in-depth appreciation and knowledge base that can be used throughout the lifetime for inquiry and decision-making regarding food.

What is a food system?

- A Whole and its Components ...
- Interactions with Other Systems ...

Where does food come from?

- Not just the Grocery Store ...
- Key Players ...
- The Influencing Forces ...

Why should we learn about food systems?

- We Need Food ...
- Broader Connections ...
- Understanding the Past ...

How do we support our food future?

- Current and Emerging Issues and Trends ...
- Sustainability and Food ...

What is a food system?

The concepts within this theme provide fundamental knowledge about food systems and encourage appreciation of the role of food in our everyday lives. Comprehending these concepts will build awareness of how a food system represents interrelationships between humans and their environment.

A Whole and its Components …

Understanding these concepts helps students and participants recognize food system scales and components.

1. A **food system** includes all processes and activities involved in keeping us fed: growing, harvesting, processing (or transforming or changing), packaging, transporting, marketing, consuming and disposing of food and food packages.

2. The term also includes the inputs needed and outputs generated at each step of the **food supply chain**. The steps depend on human resources to provide labor, research, management and/or education.

3. A food system operates within and is influenced by social, political, economic and natural environments. Hence, the system that surrounds food is complex and includes much more than just nutrition knowledge and cooking skills.

4. Each **community** has a unique food system shaped by geography, society and climate. Food systems exist on multiple scales, from the household level to the **global food system**.

5. **Systems theory**, systems science and systems thinking all refer to the concept of a set of interacting and interdependent components forming an integrated whole, and can serve as models for food systems inquiry and studies.

Interactions with Other Systems …

Recognizing the interrelationships between food systems and other systems and processes students and participants encounter every day helps them appreciate the importance of food and the world in which it is embedded.

6. **Food** is part of earth's energy systems. Food is created from energy (from the sun) and also provides energy when eaten.

7. **Ecosystems** support the production of food through **ecosystem services** such as nutrient cycling, air and water purification, pollination and pest control. Food comes from plants and animals, with help from the sun, water and soil. Ecosystems, and therefore food, are dependent on and determined by climate systems.

8. Food is part of an **economic system,** whereby goods and services are produced, distributed and consumed in society.

9. **Cultural systems** determine much about a food system: production and preparation techniques and practices, customary foods and sourcing, and rituals and spirituality surrounding food.

10. Local, national, and international **political systems** dictate food policies, along with environmental, land use, transportation and economic policies that often relate to our food supply.

11. Food plays a major role in **health systems**. Food systems affect the physical and mental health of all food producers, workers and eaters.

Where does food come from?

The concepts presented in this section provide an explanation of where food comes from, while also encouraging students and participants to investigate the why and how behind origins and sourcing. This theme strives to boost understanding of the broader context behind the diversity and availability of foods found in a community.

Not just the Grocery Store …

Food does not magically appear on grocery store shelves. Students and other program participants should understand how to trace a food item through the food supply chain and discuss some of the key resources involved.

12. Ultimately, all food comes from the earth by way of energy from the sun. Natural biological processes and **ecological cycles** make food production possible.

13. **Energy (renewable, nonrenewable)**, living organisms (plants, animals), and natural ecosystems and resources (**soil**, water, fertilizers) are all central to our food supply.

14. Due to the diversity in earth's geography and local climates, different foods are native to different places. Seasons and weather also dictate when and where certain foods are available.

15. The foods we eat travel a range of distances from where they are grown. Some are produced nearby, and some may travel internationally.

16. One can acquire food at a variety of places, including **farmers' markets**, food **cooperatives**, hunting/fishing, **foraging and gathering**, on farms, road-side stands, gardens, **community supported agriculture (CSA)** shares, independent stores and markets, vending machines, institutions, restaurants, convenience stores and grocery stores.

17. In addition to variety in where one can acquire food, food can also be grown using a variety of methods and production practices. It is important to understand this diversity and the advantages and disadvantages characteristic of different production types.

Key Players …

Developing an awareness of what other beings (human and non-human) are involved in the food system, and their various roles, helps students and participants appreciate the social and ethical aspect of the food they eat and where it comes from.

18. The food we eat comes from plants, fungi, or animals. All living things make up **food webs**, and in turn our sustenance (even if we do not eat them directly) as humans. For example, pollinators and microorganisms play a major role in food production.

19. **Producers** (farmers, ranchers, gardeners, gatherers, hunters, etc.) are crucial. Without them, insufficient quantities of food would be produced. Almost anyone can be a producer.

20. In addition to producers, other workers make up the labor force in the food system. From the farm field to the plate, there are often many laborers from diverse backgrounds and situations involved in the food supply chain. Some examples include factory workers, **processors**, **marketers**, cooks and **distributors**.

21. Businesses, companies and organizations are part of the economic aspects of a food system. Trade negotiations, marketing plans and budgets and costs are often decided by boards, management and committees at some step along the food supply chain.

22. **Policymakers** and **politicians** are involved with laws and regulations that affect food and how it arrives on our plates.

23. **Consumers**, and how they act within the food system, determine much about how the systems functions. Purchases, eating habits, waste habits, and level of general involvement are key factors in creating our food systems. Consumers are also actors within communities, families, organizations, businesses and political arenas.

24. Scientists, teachers, and other educators investigate food systems and disseminate information through their research findings and teachings, oftentimes leading to developments in food and technology.

The Influencing Forces …

In addition to physical geography, biological resources, species diversity and climate, a wide variety of societal-based influencers construct and direct where the food we eat comes from, and what food is available in our communities.

25. History is vital in understanding available food supplies, both locally and globally. Economic history, environmental and cultural history have all shaped food systems and will continue to do so in the future. Likewise, past and future trends within these same realms shape our food systems.

26. Marketing and advertising target and influence all demographics, encouraging and promoting the consumption of various foods, **commodities** and food related products.

27. **Health care industries**, as well as national and state agencies affiliated with education, **public health** and **dietary guidelines**, influence the national health voice as it relates to **food provisioning** and consumption.

28. Science and technology foster inquiry and innovation that oftentimes lead to new practices and developments in our food systems. Research and technological advances (such as refrigeration, tractors and **genetically modified organisms [GMOs]**) have played a pivotal role in the evolution of the food supply chain.

29. **Values** and choices on the individual and societal levels largely create our food systems. Existing options, laws, **accessibility** and availability within the food environment influence how people make choices to purchase, grow and consume the foods they do. How people negotiate these parameters is contingent on their knowledge base, personal values, **socioeconomic factors**, and the social values and pressures that surround them.

30. Policies, regulations, **supply and demand**, and **subsidies** impact food and land availability and cost, and therefore the choices producers and consumers are able to make. Citizens can help influence and shape policy through voting, advocacy, and by being politically aware and active.

31. These influencers (history, marketing, the health industry, science and technology, personal and social values, and policy) represent the main factors we can study and apply if we seek to make changes to the food system.

Why should we learn about food systems?

Concepts in this section aim to expose students and participants to the many reasons why learning about food systems is important. Building off of the interrelationships introduced in the previous themes, this theme will offer more connections that exist between humans and their food, and the effects created from those connections.

We Need Food …

Introducing these concepts reveals our dependence on food to survive. Our relationship with food needs to support both human health and the health of the planet to ensure an adequate and healthy food supply now and in the future.

32. Food, like water and shelter, is essential for our survival as a species. Food is not merely a novelty or commodity, but is a source of sustenance.

33. Our health, in addition to our survival, depends on our food supply. We absorb **nutrients** and **calories** from the food we ingest, providing us with energy and the ability to perform essential bodily functions.

34. Food is part of our everyday lives and the enjoyment of life. We constantly make decisions about what to eat, when to eat, where to get food and how much to eat.

35. In recognizing that we need food to live, we also realize that the land and water from which food comes is also directly related to our survival. Our food supply is dependent on ecosystems.

Broader Connections …

Beyond learning about health and our basic dependence on food for sustenance, it is important to introduce how many connections exist between food systems and other parts of our lives. A food system does not stand alone. Rather, it depends on and shapes many other facets of our society and planet. It is important to study food systems to understand how all of these facets are connected and affected by our actions.

36. Food systems are inherently connected to **fuel supplies** and energy. All components of the food supply chain, from consumption to waste, require energy to function. Various food systems practices require and use different amounts and forms of energy.

37. In order to get food to consumers, food is often transported through various networks around the globe. Food is sometimes freighted via trucks, aircraft, ships and trains, all of which require fuel and influence land use.

38. Food systems, mainly by way of food production, affect **land use**. Agricultural landscapes occupy much of the arable land on earth, and the inputs and outputs associated with agriculture oftentimes alter landscapes and the natural resources on them.

39. Water is essential to food systems. The substance is crucial for all life, and is involved at every step along the food supply chain. **Water cycles**, which include natural water bodies like rivers, lakes, oceans and groundwater, are directly and indirectly related to food systems.

40. **Culture** and food share a strong bond. Molded through time, traditions and beliefs, food will always play a central role in any culture. Every culture is characterized by unique food behaviors and culinary practices.

Understanding the Past …

By comprehending these concepts, students and participants will have a substantial introduction to how the modern global food system emerged, in relationship to the evolution of farming, the food industry, and consumption patterns. The evolution of food and food systems structures is connected to the evolution of other things (mobility, health, professions, politics, manipulation of nature, cultural relationships, etc.).

41. **Gathering and hunting** served as the primary method of food provisioning for early humans. The transition towards agriculturally dominated civilizations mainly occurred between 5,000 and 10,000 years ago.

42. The rise of **agriculture** allowed for the rise of permanent settlements, some of the earliest civilizations, and tremendous growth in the global population. Developments in class structure and social and racial inequalities followed, many aspects of which still continue throughout the world.

43. From the earliest civilizations to present day, population growth and production advances and challenges interplayed to generate eras of prosperity and **famine**. The plow and irrigation systems were two primary technologies that boosted production and allowed for further population growth. Poorly managed farmland sometimes led to erosion and decreased **soil fertility**, often contributing to **malnutrition** and **famine**.

44. Technological advances and globalization trends, beginning in the mid-17th century and continuing today, allow for global food exchanges and transportation. During the **Industrial Revolution era** (1760-1850) transportation networks and technologies (such as refrigeration) further improved, along with **food processing** and **preservation** techniques, together creating more widespread food availability.

45. **Synthetic fertilizers** emerged in the early 1900s, boosting production and spawning modern **industrial agriculture** as we know it. More workers left farms for jobs in the city, mechanization ensued, and specialized farms replaced diversified farms. Chemical and **fossil fuel** inputs became commonplace in mainstream agriculture.

46. The first version of the **farm bill** came to life during the **Great Depression**, and since that time has served as the U.S. federal government's primary food and agricultural policy tool.

47. The dominant modern food system has been consolidated and standardized in the name of efficiency and **economies of scale**, as our global population continues to grow and require more food. As such, more food system changes have occurred in the last 100 years than in the previous 10,000.

48. Throughout all of these eras, **diversity** existed and continues to exist within nearly every aspect of food systems. For example, hunter/gatherer communities still exist today, and the modern global food system has not eradicated famine. Production and consumption patterns continue to vary by individual and community, and these localized, often culture-based patterns are important to characterize.

How do we support our food future?

This theme exposes students and participants to existing issues and trends within our food systems, which, when coupled with an understanding of the past, point towards topics to address and possible channels of how our food future could unfold. Sustainability concepts are introduced to encourage long-term thinking and respect for the future of humanity and the planet.

Current and Emerging Issues and Trends …

This section presents current widespread issues and trends in our food systems, building awareness and exposure so as to encourage care and involvement. Many of these problems overlap and intersect, with solutions interspersed throughout. Many of the problems presented stem from the overall impact of the dominant, fossil-fuel based global food system.

49. Our food systems have effects on the environment and natural ecosystems that surround us.

    a. Water supplies worldwide are threatened in terms of both quality and quantity, and marine fisheries are deteriorating. **Runoff** and pollution from our food systems have created **hypoxia** and contamination problems in water bodies throughout the globe. Groundwater supplies are threatened from overuse and contamination.

    b. Poorly managed fragile lands are leading to **desertification** problems, and rainforests are continually being cleared. More than a century of intensive agriculture in some places has drastically altered habitats, waterways, land cover and soil quality.

    c. Intense, concentrated, and continual agriculture during the past century has created **topsoil erosion** issues, a loss of stored carbon in the soil, and issues of **soil compaction** and reduced fertility.

    d. **Habitat loss**, due in part to clearing and claiming land for agriculture, is resulting in enormous losses in **biome**, animal and plant **biodiversity**. The crops and animals produced for our food supply have also become **homogenized**, as our mainstream food system has become increasingly standardized and specialized.

    e. Pollution, toxicity and contamination issues have increased globally because of **pesticide** and fertilizer application, reliance on fossil fuels, runoff issues, and **waste management** practices within food systems.

50. The waste and outputs produced within a food system are often overlooked or discarded, a practice which is causing major societal and environmental problems.

    a. The dominant modern day food system model is **linear**, where discarded food, human and agricultural animal waste products are isolated and often not reincorporated back into production practices.

    b. Much of the unused food in industrialized countries ends up in landfills, a pattern which fails to take advantage of the nutrients and energy in that food, and also contributes to land use issues.

    c. According to the United Nations, roughly 40 percent of the food suitable for human consumption in the U.S. is never eaten and goes to waste. With similar situations in other industrialized countries, food waste is a major issue globally.

    d. Human sewage and animal manure are part of the food system. Major industries and systems have developed to manage waste, with some experiencing more success than others. It is important to understand the variety of **waste management** techniques and approaches available.

51. Food systems impact communities and the people in them. The issues are diverse, both within individual communities and among different global societies.

    a. Concerns about **food security** have existed throughout history and continue today throughout the globe. **Globalization** trends, **sustainable development**, **wealth disparities**, and an increasing global population are all key components in today's discussion about food security.

    b. Racial, gender and income-based inequalities oftentimes affect **food security** and have led to discussions about **food justice** and **food sovereignty**. Both movements refer to the rights of people and communities to define their own food systems, along with their right to **healthy** and culturally appropriate food.

    c. As agriculture industrialized in the U.S., farms became more specialized, concentrated and mechanized. This reduced the need for manual labor and hence the population of farmers began and continues to decline. Many modern farmers hold specialized knowledge and experience rather than the **diversified farming** knowledge that was once more common.

    d. Living in an era in the U.S. of **fast and convenient foods**, the general population has lost many food related skills that were once an important component of everyday life. Growing, identifying, **processing**, **preserving** and cooking foods are components of our food systems that people often no longer engage in, value or understand.

    e. **Malnutrition** concerns exist throughout the world. **Obesity** and other **chronic**, diet-related health ailments are common and often preventable with the help of informed food choices and **food environments** that support them. Issues of hunger and undernutrition persist globally, along with food safety concerns for all those along the food supply chain.

    f. Food systems issues vary by community and country. Globally, however, overpopulation and inequity are main contributors to other issues.

52. **Climate change** is closely related to food production, along with other key components of our food systems. Climate change related issues affect some communities more than others, as existing conditions and the changes occurring are different throughout the world.

    a. Globally, food systems account for an estimated one-third of **greenhouse gas emissions**. Some **food supply chain** practices contribute to greenhouse gas emissions more than others, particularly in relationship to animal production, loss in stored soil carbon and food transportation networks.

    b. Changes in drought patterns, sea level rise, glacial and snowpack melting, and increased frequency of extreme natural disasters and weather are causing dynamic shifts in water availability and supply.

    c. **Desertification** issues are intensifying, making some farming systems less stable.

    d. Temperature shifts will likely contribute to altered seasonal weather patterns, influencing food production.

    e. Extreme events such as fires, heat waves, floods, storms and droughts affect the food supply chain and **food access** and availability.

    f. Ecosystem changes, on land and in water bodies, contribute to extinction, **biodiversity** loss, and changes in **distribution patterns** of pests and diseases.

53. Food system practices and movements with less negative impacts associated with them, compared to the modern, dominant, fossil fuel-based global food system structures, exist and continue to gain momentum within Wisconsin, the U.S., and beyond. Some examples include urban agriculture, school and community gardens, **farmers' markets**, **CSAs** and diversified production techniques like **permaculture** and **agroforestry.**

Sustainability and Food …

Discussing the idea of sustainability offers the opportunity for students and participants to evaluate modern food system practices and analyze how these practices and their alternatives interact with quality of life now and in the future.

54. Our modern **global food system** emerged and developed during the last century. This period of relatively abundant calories, developed alongside and largely dependent on **intensive agriculture** and **fossil fuels**, is a relatively short era in the long span of both human existence and the existence of **agriculture**.

55. A **sustainable food system**, of any scale, meets existing food and nutrition needs without compromising the ability of future food systems to meet the needs of future generations. Both now and in the future, this translates to conserving, protecting and regenerating the natural resources, landscapes and **biodiversity** that provide us with food, while also supporting healthy and **resilient** economies and societies.

56. Food represents a cultural and an agricultural act. Recognizing how food is a bridge between humans and the rest of nature, and keeping that recognition transparent and paramount, will help support environmental, societal and economic **sustainability**.

57. We all have an important role to play and voice to contribute within food systems.

    a. As eaters acting within communities, we all play the consumer and citizen roles. Options exist for students and participants to play other roles, such as producer, educator, laborer, etc. All of the roles are valued, and nearly any discipline, skill and talent can be applied in food systems work. It is important to engage in some way other than only as a consumer.

    b. Molded through values, opportunities and constraints, we all have options available with choices attached to them. Ideally, informed choices should be responsibly made to reflect values, as every decision can support existing practices, advocate for change and/or drive demand.

    c. Farmers and other food producers are key stewards within our food systems, as they often represent that crucial connection between agriculture and culture.

    d. In making choices today, we should recognize how we create the future. If we seek to support sustainability in our food systems, steering involvement and thinking long term to promote sustainability is a wise investment.

Suggested Scope and Sequence

Introduction and Explanation

This section provides guidelines for when and to what extent to incorporate food systems education concepts into pK-12 school educational materials. This suggested scope and sequence was developed through the input of pK-12 teachers and community educators who participated in a workshop in November 2014. Attendees aligned the concepts in the framework to the grade levels at which they should be taught, based on subject area knowledge and student knowledge at various grade levels. Note that this scope and sequence is not a prescribed approach. Rather, the suggested timeline and order should be used as a reference and guide for educators as they create, evaluate or reassess food systems education in their district or school. For example, after reviewing the document and comparing it to existing curricula, educators and curriculum designers may feel that many of the concepts are already being addressed in their school or district. Others may find that many of the concepts are not being addressed, and therefore courses may need to be revised to include them.

Community level educational programming (informal and formal) are not explicitly included in this scope and sequence. However, the framework can be used for developing or assessing education programs in community settings, as it serves as a reference for food systems literacy for any grade or education level.

Understanding the Diagrams

The scope and sequence is divided into the four theme headings, with the numbered concepts and subconcepts placed within the subthemes they appear in in the framework. This structure visually represents the grade level categories (pK-4, 5-8, 9-12), and how the concepts are introduced and spiral to higher grade levels. Some of the concepts are foundational to food systems education and should be addressed at each grade level. Other concepts enhance or build off of core ideas and may only be addressed at one or two grade level categories. Once a concept is fully stated in the diagram, it will be abbreviated in the successive grade level categories and appear with an ellipsis. In general, the concepts are introduced, developed, mastered, and then reviewed as the grade levels progress. The grade level category distinctions were chosen to match the other conceptual frameworks at the Wisconsin Center for Environmental Education.

What is a food system?

The concepts within this theme provide fundamental knowledge about food systems and encourage appreciation of the role of food in our everyday lives. Comprehending these concepts will build awareness of how a food system represents interrelationships between humans and their environment.

A Whole and its Components ...

Grades pK-4

(1) A food system includes all processes and activities involved in keeping us fed: growing, harvesting, processing (or transforming or changing), packaging, transporting, marketing, consuming and disposing of food and food packages.

(2) The term also includes the inputs needed and outputs generated at each step of the food supply chain. The steps depend on human resources to provide labor, research, management and/or education.

(3) A food system operates within and is influenced by social, political, economic and natural environments. Hence, the system that surrounds food is complex and includes much more than just nutrition knowledge and cooking skills.

(4) Each community has a unique food system shaped by geography, society and climate. Food systems exist on multiple scales, from the household level to the global food system.

Grades 5-8

(1) A food system includes ...

(2) The term also includes the inputs needed and outputs ...

(3) A food system operates within ...

(4) Each community has a unique food system ...

Grades 9-12

(1) A food system includes ...

(2) The term also includes the inputs needed and outputs ...

(3) A food system operates within ...

(4) Each community has a unique food system ...

(5) Systems theory, systems science and systems thinking all refer to the concept of a set of interacting and interdependent components forming an integrated whole, and can serve as models for food systems inquiry and studies.

Interactions with Other Systems ...

Grades pK-4

(6) Food is part of earth's energy systems. Food is created from energy (from the sun) and also provides energy when eaten.

(7) Ecosystems support the production of food through ecosystem services such as nutrient cycling, air and water purification, pollination and pest control. Food comes from plants and animals, with help from the sun, water and soil. Ecosystems, and therefore food, are dependent on and determined by climate systems.

(8) Food is part of an economic system, whereby goods and services are produced, distributed and consumed in society.

(9) Cultural systems determine much about a food system: production and preparation techniques and practices, customary foods and sourcing, and rituals and spirituality surrounding food.

(11) Food plays a major role in health systems. Food systems affect the physical and mental health of all food producers, workers and eaters.

Grades 5-8

(6) Food is part of earth's energy systems ...

(7) Ecosystems support the production of food ...

(8) Food is part of an economic system ...

(9) Cultural systems determine much about a food system ...

(11) Food plays a major role in health systems ...

Grades 9-12

(6) Food is part of earth's energy systems ...

(7) Ecosystems support the production of food ...

(8) Food is part of an economic system ...

(9) Cultural systems determine much about a food system ...

(10) Local, national and international political systems dictate food policies, along with environmental, land use, transportation and economic policies that often relate to our food supply.

(11) Food plays a major role in health systems ...

Where does food come from?

The concepts presented in this section provide an explanation of where food comes from, while also encouraging students and participants to investigate the why and how behind origins and sourcing. This theme strives to boost understanding of the broader context behind the diversity and availability of foods found in a community.

Not just the Grocery Store ...

Grades pK-4

(12) Ultimately, all food comes from the earth by way of energy from the sun. Natural biological processes and ecological cycles make food production possible.

(13) Energy (renewable, nonrenewable), living organisms (plants, animals), and natural ecosystems and resources (soil, water, fertilizers) are all central to our food supply.

(14) Due to the diversity in earth's geography and local climates, different foods are native to different places. Seasons and weather also dictate when and where certain foods are available.

(15) The foods we eat travel a range of distances from where they are grown. Some are produced nearby, and some may travel internationally.

(16) One can acquire food at a variety of places, including farmers' markets, food cooperatives, hunting/fishing, foraging and gathering, on farms, road-side stands, gardens, community supported agriculture (CSA) shares, independent stores and markets, vending machines, institutions, restaurants, convenience stores and grocery stores.

Grades 5-8

(12) Ultimately, all food comes from the earth by way of energy from the sun ...

(13) Energy (renewable and nonrenewable), living organisms (plants, animals, pollinators), and natural ecosystems and resources (soil, water, fertilizers) are all central to our food supply.

(14) Due to the diversity in earth's geography and local climates, different foods are native to different places ...

(15) The foods we eat travel a range of distances from where they are grown ...

(16) One can acquire food at a variety of places ...

Grades 9-12

(12) Ultimately, all food comes from the earth by way of energy from the sun ...

(13) Energy (renewable and nonrenewable) ...

(14) Due to the diversity in earth's geography and local climates, different foods are native to different places ...

(15) The foods we eat travel a range of distances from where they are grown ...

(16) One can acquire food at a variety of places ...

(17) In addition to variety in where one can acquire food, food can also be grown using a variety of methods and production practices. It is important to understand this diversity and the advantages and disadvantages characteristic of different production types.

Key Players ...

Grades pK-4

(18) The food we eat comes from plants, fungi or animals. All living things make up food webs, and in turn our sustenance (even if we do not eat them directly) as humans. For example, pollinators and microorganisms play a major role in food production.

(19) Producers (farmers, ranchers, gardeners, gatherers, hunters, etc.) are crucial. Without them, insufficient quantities of food would be produced. Almost anyone can be a producer.

(23) Consumers, and how they act within the food system, determine much about how the systems functions. Purchases, eating habits, waste habits and level of general involvement are key factors in creating our food systems. Consumers are also actors within communities, families, organizations, businesses and political arenas.

Grades 5-8

(18) The food we eat comes from plants, fungi, or animals ...

(19) Producers (farmers, ranchers, gardeners, gatherers, hunters, etc.) are crucial ...

(20) In addition to producers, other workers make up the labor force in the food system. From the farm field to the plate, there are often many laborers from diverse backgrounds and situations involved in the food supply chain. Some examples include factory workers, processors, marketers, cooks and distributors.

(22) Policy makers and politicians are involved with laws and regulations that affect food and how it arrives on our plates.

(23) Consumers, and how they act within the food system ...

Grades 9-12

(18) The food we eat comes from plants, fungi, or animals ...

(19) Producers (farmers, ranchers, gardeners, gatherers, hunters, etc.) are crucial ...

(20) In addition to producers, other workers make up the labor force in the food system ...

(21) Businesses and organizations are part of the economic aspects of a food system. Trade negotiations, marketing plans, and budgets and costs are often decided by boards, management and committees at some step along the food supply chain.

(22) Policy makers and politicians are involved ...

(23) Consumers, and how they act within the food system ...

(24) Scientists, teachers and other educators investigate food systems and disseminate information through their research findings and teachings, oftentimes leading to developments in food and technology.

The Influencing Forces ...

Grades pK-4

(25) History is vital in understanding available food supplies, both locally and globally. Economic history, environmental and cultural history have all shaped food systems and will continue to do so in the future. Likewise, past and future trends within these same realms shape our food systems.

(26) Marketing and advertising target and influence all populations and age groups, encouraging and promoting the consumption of various foods, commodities and food related products.

(28) Science and technology foster inquiry and innovation that oftentimes lead to new practices and developments in our food systems. Research and technological advances (such as refrigeration, tractors and genetically modified organisms [GMOs]) have played a pivotal role in the evolution of the food supply chain.

(29) Values and choices on the individual and societal levels largely create our food systems. Existing options, laws, accessibility and availability within the food environment influence how people make choices to purchase, grow and consume the foods they do. How people negotiate these parameters is contingent on their knowledge base, personal values, socio-economic factors, and the social values and pressures that surround them.

Grades 5-8

(25) History is vital in understanding available food supplies ...

(26) Marketing and advertising target and influence ...

(27) Health care industries, as well as national and state agencies affiliated with public education, public health and dietary guidelines, influence the national health voice as it relates to food provisioning and consumption.

(28) Science and technology foster inquiry and innovation ...

(29) Values and choices on the individual and societal levels largely create our food system ...

Grades 9-12

(25) History is vital in understanding available food supplies ...

(26) Marketing and advertising target and influence ...

(27) Health care industries, as well as national and state agencies ...

(28) Science and technology foster inquiry and innovation ...

(29) Values and choices on the individual and societal levels largely create our food system ...

(30) Policies, regulations, supply and demand, and subsidies impact food and land availability and cost, and therefore the choices producers and consumers are able to make. Citizens can help influence and shape policy through voting, advocacy, and by being politically aware and active.

(31) These influencers (history, marketing, the health industry, science and technology, personal and social values, and policy) represent the main factors we can study and apply if we seek to make changes to the food system.

Why should we learn about food systems?

Concepts in this section aim to expose students and participants to the many reasons why learning about food systems is important. Building off of the interrelationships introduced in the previous themes, this theme will offer more connections that exist between humans and their food, and the effects created from those connections.

Grades pK-4

We Need Food ...

(32) Food, like water and shelter, is essential for our survival as a species. Food is not merely a novelty or commodity, but a source of sustenance.

(33) Our health, in addition to our survival, depends on our food supply. We absorb nutrients and calories from the food we ingest, providing us with energy and the ability to perform essential bodily functions.

(34) Food is part of our everyday lives and the enjoyment of life. We constantly make decisions about what to eat, when to eat, where to get food, and how much to eat.

(35) In recognizing that we need food to live, we also realize that the land and water from which food comes is also directly related to our survival. Our food supply is dependent on ecosystems.

Broader Connections ...

(36) Food systems are inherently connected to fuel supplies and energy. All components of the food supply chain, from consumption to waste, require energy to function. Various food systems practices require and use different amounts and forms of energy.

(37) In order to get food to consumers, food is often transported through various networks around the globe. Food is sometimes freighted via trucks, aircraft, ships and trains, all of which require fuel and influence land use.

(38) Food systems, mainly by way of food production, affect land use. Agricultural landscapes occupy much of the arable land on earth, and the inputs and outputs associated with agriculture oftentimes alter landscapes and the natural resources on them.

(39) Water is essential to food systems. The substance is crucial for all life, and is involved at every step along the food supply chain. Water cycles, which include natural water bodies like rivers, lakes, oceans, and groundwater, are directly and indirectly related to food systems.

(40) Culture and food share a strong bond. Molded through time, traditions and beliefs, food will always play a central role in any culture. Every culture is characterized by unique food behaviors and culinary practices.

Understanding the Past ...

(41) Gathering and hunting served as the primary method of food provisioning for early humans. The transition towards agriculturally dominated civilizations mainly occurred between 5,000 and 10,000 years ago.

(42) The rise of agriculture allowed for the rise of permanent settlements, some of the earliest civilizations, and tremendous growth in the global population. Developments in class structure and social and racial inequalities followed, many aspects of which still continue throughout the world.

(48) Throughout all of these eras, diversity existed and continues to exist within nearly every aspect of food systems. For example, hunter/gatherer communities still exist today, and the modern global food system has not eradicated famine. Production and consumption patterns continue to vary by individual and community, and these localized, often culture-based patterns are important to characterize.

Scope and Sequence

Grades 5-8

(32) Food, like water and shelter, is essential for our survival as a species ...

(33) Our health, in addition to our survival, depends on our food supply ...

(34) Food is part of our everyday lives ...

(35) In recognizing that we need food to live, we also realize ...

(36) Food systems are inherently connected to fuel supplies and energy ...

(37) In order to get food to consumers, food is often transported through various networks ...

(38) Food systems, mainly by way of food production, affect land use ...

(39) Water is essential to food systems. The substance is crucial for all life ...

(40) Culture and food share a strong bond ...

(41) Gathering and hunting served as the primary method of food provisioning for early humans ...

(42) The rise of agriculture allowed for the rise of permanent settlements ...

(43) From the earliest civilizations to present day, population growth and production advances and challenges interplayed to generate eras of prosperity and famine. The plow and irrigation systems were two primary technologies that boosted production and allowed for further population growth. Poorly managed farmland often led to erosion and decreased soil fertility, often contributing to malnutrition and famine.

(44) Technological advances and globalization trends, beginning in the mid-17th century and continuing today, allow for global food exchanges and transportation. During the industrial revolution era (1760-1850) transportation networks and technologies (such as refrigeration) further improved, along with food processing and preservation techniques.

(45) Synthetic fertilizers emerged in the early 1900s, boosting production and spawning modern industrial agriculture as we know it. More workers left farms for jobs in the city, mechanization ensued, and specialized farms replaced diversified farms. Chemical and fossil fuel inputs became commonplace in mainstream agriculture.

(46) The first version of the farm bill came to life during the Great Depression, and since that time has served as the U.S. federal government's primary food and agricultural policy tool.

(47) The dominant modern food system has been consolidated and standardized in the name of efficiency and economies of scale, as our global population continues to grow and require more food. As such, more food system changes have occurred in the last 100 years than in the previous 10,000.

(48) Throughout all of these eras, diversity existed and continues to exist within nearly every aspect of food systems ...

Scope and Sequence

Grades 9-12

(32) Food, like water and shelter, is essential for our survival as a species ...

(33) Our health, in addition to our survival, depends on our food supply ...

(34) Food is part of our everyday lives ...

(35) In recognizing that we need food to live, we also realize ...

(36) Food systems are inherently connected to fuel supplies and energy ...

(37) In order to get food to consumers, food is often transported through various networks ...

(38) Food systems, mainly by way of food production, affect land use ...

(39) Water is essential to food systems. The substance is crucial for all life ...

(40) Culture and food share a strong bond ...

(41) Gathering and hunting served as the primary method of food provisioning for early humans ...

(42) The rise of agriculture allowed for the rise of permanent settlements ...

(43) From the earliest civilizations to present day, population growth and production advances and challenges interplayed ...

(44) Technological advances and globalization trends, beginning in the mid-17th century, allowed for global food exchanges and transportation ...

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(46) The first version of the farm bill came to life during the Great Depression ...

(47) The dominant modern food system has been consolidated and standardized ...

(48) Throughout all of these eras, diversity existed and continues to exist within nearly every aspect of food systems ...

How do we support our food future?

This theme exposes students and participants to existing issues and trends within our food systems, which, when coupled with an understanding of the past, can point towards possible channels of how our food future could unfold. Sustainability concepts are introduced to encourage long-term thinking and respect for the future of humanity and the planet.

Current and Emerging Issues and Trends ...

Grades pK-4

(49) Our food systems have effects on the environment and natural ecosystems that surround us.
- (a) Water supplies worldwide are threatened in terms of both quality and quantity, and marine fisheries are deteriorating. Runoff and pollution from our food systems have created hypoxia and contamination problems in water bodies throughout the globe. Groundwater supplies are threatened from overuse and contamination.
- (c) Intense, concentrated, and continual agriculture during the past century has created topsoil erosion issues, a loss of stored carbon in the soil, and issues of soil compaction and reduced fertility.
- (d) Habitat loss, due in part to clearing and claiming land for agriculture, is resulting in enormous losses in plant, animal and biome biodiversity. The crops and animals produced for our food supply have also become homogenized, as our mainstream food system has become increasingly standardized and specialized.
- (e) Pollution, toxicity, and contamination issues have increased globally because of pesticide and fertilizer application, reliance on fossil fuels, runoff issues, and waste management practices within food systems.

(50) The waste and outputs produced within a food system are often overlooked or discarded, a practice which is causing major societal and environmental problems.
- (a) The dominant modern day food system model is linear, where discarded food, human, and agricultural animal waste products are isolated and often not reincorporated back into production practices.
- (c) According to the United Nations, roughly 40 percent of the food suitable for human consumption in the U.S. is never eaten and goes to waste. With similar situations in other industrialized countries, food waste is a major issue globally.

(51) Food systems impact communities and the people in them. The issues are diverse, both within individual communities and among different global societies.
- (d) Living in an era in the U.S. of fast and convenient foods, the general population has lost many food related skills that were once an important component of everyday life. Growing, identifying, processing, preserving and cooking foods are components of our food systems that people often no longer engage in, value, or understand.
- (e) Malnutrition concerns exist throughout the world. Obesity and other chronic, diet-related health ailments are common and often preventable with the help of informed food choices and food environments that support them. Issues of hunger and undernutrition persist globally, along with food safety concerns for all those along the food supply chain.

(52) Climate change is closely related to food production, along with other key components of our food systems. Climate change related issues affect some communities more than others, as existing conditions and the changes occurring are different throughout the world.
- (e) Extreme events such as fires, heat waves, floods, storms and droughts affect the food supply chain and food access and availability.

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(49) Our food systems have effects on the environment and natural ecosystems that surround us. *(a, c, d, e)*
- (b) Poorly managed fragile lands are leading to desertification problems, and rainforests are continually being cleared. More than a century of intensive agriculture in some places has drastically altered habitats, waterways, land cover and soil quality.

(50) The waste and outputs produced within a food system are often overlooked or discarded ... *(a, c)*
- (b) Much of the unused food in industrialized countries ends up in landfills, a pattern which fails to take advantage of the nutrients and energy in that food, and also contributes to land use issues.
- (d) Human sewage and animal manure are part of the food system. Major industries and systems have developed to manage waste, with some experiencing more success than others. It is important to understand the variety of waste management techniques and approaches available.

Grades 5-8

(51) Food systems impact communities and the people in them ... *(d, e)*
- (a) Concerns about food security have existed throughout history and continue today throughout the globe. Globalization trends, sustainable development, wealth disparities, and an increasing global population are all key components in today's discussion about food security.
- (b) Racial, gender and income-based inequalities oftentimes affect food security and have led to discussions about food justice and food sovereignty. Both movements refer to the rights of people and communities to define their own food systems, along with their right to healthy and culturally appropriate food.
- (c) As agriculture industrialized in the U.S., farms became more specialized, concentrated and mechanized. This reduced the need for manual labor and hence the population of farmers began and continues to decline. Many modern farmers hold specialized knowledge and experience rather than the diversified farming knowledge that was once more common.
- (f) Food systems issues vary by community and country. Globally, however, overpopulation and inequity are main contributors to other issues.

(52) Climate change is closely related to food production ... *(e)*
- (a) Globally, food systems account for an estimated one-third of greenhouse gas emissions. Some food supply chain practices contribute to greenhouse gas emissions more than others, particularly in relationship to animal production, loss in stored soil carbon, and food transportation networks.
- (b) Changes in drought patterns, sea level rise, glacial and snowpack melting, and increased frequency of extreme natural disasters and weather are causing dynamic shifts in water availability and supply.
- (c) Desertification issues are intensifying, making some farming systems less stable.
- (d) Temperature shifts will likely contribute to altered seasonal weather patterns, influencing food production.
- (f) Ecosystem changes, on land and in water bodies, contribute to extinction, biodiversity loss, and changes in distribution patterns of pests and diseases.

(53) Food system practices and movements with less negative impacts associated with them, compared to the modern, dominant, fossil fuel based global food system structures, exist and continue to gain momentum within Wisconsin, the US, and beyond. Some examples include urban agriculture, school and community gardens, farmers' markets, CSAs and diversified production techniques like permaculture and agroforestry.

Grades 9-12

(49) Our food systems have effects on the environment and natural ecosystems that surround us. *(a, b, c, d, e)*

(50) The waste and outputs produced within a food system are often overlooked or discarded, a practice which is causing major societal and environmental problems. *(a, b, c, d)*

(51) Food systems impact communities and the people in them. The issues are diverse, both within individual communities and among different global societies. *(a, b, c, d, e, f)*

(52) Climate change is closely related to food production, along with other key components of our food systems. Climate change related issues affect some communities more than others, as existing conditions and the changes occurring are different throughout the world. *(a, b, c, d, e, f)*

(53) Food system practices and movements with less negative impacts associated with them ...

Sustainability and Food ...

(55) A sustainable food system, of any scale, meets existing food and nutrition needs without compromising the ability of future food systems to meet the needs of future generations. Both now and in the future, this translates to conserving, protecting and regenerating the natural resources, landscapes and biodiversity that provide us with food, while also supporting healthy and resilient economies and societies.

(56) Food represents a cultural and an agricultural act. Recognizing how food is a bridge between humans and the rest of nature, and keeping that recognition transparent and paramount, will help support environmental, societal and economic sustainability.

(57) We all have an important role to play and voice to contribute within food systems.
- (a) As eaters acting within communities, we all play the consumer and citizen roles. Options exist for students and participants to play other roles, such as producer, educator, laborer, etc. All of the roles are valued, and nearly any discipline, skill and talent can be applied in food systems work. It is important to engage in some way other than only as a consumer.
- (b) Molded through values, opportunities and constraints, we all have options available with choices attached to them. Ideally, informed choices should be responsibly made to reflect values, as every decision can support existing practices, advocate for change, and/or drive demand.
- (c) Farmers and other food producers are key stewards within our food systems, as they often represent that crucial connection between agriculture and culture.
- (d) In making choices today, we should recognize how we create the future. If we seek to support sustainability in our food systems, steering involvement and thinking long term to promote sustainability is a wise investment.

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(54) Our modern global food system emerged and developed during the last century. This period of relatively abundant calories, developed alongside and largely dependent on intensive agriculture and fossil fuels, is a relatively short era in the long span of both human existence and the existence of agriculture.

(55) A sustainable food system, of any scale, meets existing food and nutrition needs without compromising ...

(56) Food is both a cultural and an agricultural act ...

(57) We all have an important role to play and voice to contribute within food systems. *(a, b, c, d)*

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(54) Our modern global food system emerged and developed during the last century ...

(55) A sustainable food system, of any scale, meets existing food and nutrition needs without compromising ...

(56) Food is both a cultural and an agricultural act ...

(57) We all have an important role to play and voice to contribute within food systems. *(a, b, c, d)*

Scope and Sequence

Glossary

Definitions of some terms relative to use in this document are provided for clarity. The terms are bolded within the Conceptual Framework text.

Agriculture
The science, art or practice of cultivating soil, producing crops and raising livestock.

Agroforestry
A land use management system in which trees or shrubs are grown around or among crops or pastureland, combining agricultural and forestry technologies to create more diverse, productive, healthy and sustainable land-use systems.

Biodiversity
In general, the degree of variation in life. A measure of the variety of organisms present in different ecosystems, referring to genetic variation, ecosystem variation and/or species variation.

Biome
A regional ecosystem characterized by distinct types of vegetation, animals and microbes that have developed under specific soil and climatic conditions.

Calories
A measure of energy in food. Specifically, the measure of heat needed to raise one gram of water by one degree Celsius.

Chronic
Human health condition or disease that is persistent or otherwise long lasting in its effects, or a disease that comes with time.

Climate change
A change in global or regional climate patterns, in particular a change apparent from the mid-to-late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.

Commodity
A raw material or primary agricultural product that can be bought and sold, such as corn.

Community
A group of people living in the same place or having a particular characteristic in common, including a feeling of fellowship with others as a result of sharing common attitudes, interests and goals.

Community supported agriculture (CSA)
A CSA refers to a particular network or association of individuals who have pledged to support one or more local farms, with growers and consumers sharing the risks and benefits of food production.

Consumer
A person who purchases or eats food.

Cooperative
A member-owned, member-controlled business that operates for the mutual benefit of all members and according to common principles established for cooperatives. Decisions regarding the production and distribution of its food are chosen by its members.

Cultivable land
Land capable of being cultivated, able to be used for farming.

Culture
The beliefs, customs, arts, etc., of a particular society, group, place or time.

Cultural systems
The interaction of different elements of culture; including behavior patterns, arts, beliefs, institutions and other products of human work and thought.

Desertification
The process by which fertile lands becomes desert, typically as a result of drought, deforestation or inappropriate agriculture.

Dietary guidelines
Food and physical activity recommendations that serve as the foundation of federal nutrition policy and nutrition education activities, issued and updated every five years by the Department of Agriculture (USDA) and Health and Human Services (HHS).

Distribution patterns
Where something is typically found on the globe; territory or range (for animals).

Distributors
Those involved in the process of dividing up, spreading out, and delivering food to processing plants, food stores, markets, etc.

Diversified farming
The process of producing a variety of crops or animals (or both) on one farm, as distinguished from specializing in a single commodity.

Diversity
The quality or state of having many different forms, types or elements.

Ecological cycles
The various self-regulating processes that recycle the earth's limited resources - water, carbon, nitrogen and other elements essential to sustain life.

Economies of scale
A proportionate saving in costs gained by an increased level of production.

Economic system
A system of production and exchange of goods and services as well as allocation of resources in a society.

Ecosystem
A self-regulating natural community of organisms (e.g. plants, animals, bacteria) interacting with one another and with their nonliving environment. Wetlands, forests and lakes are examples.

Ecosystem services
The important benefits for human beings that arise from functioning ecosystems, categorized into four groupings: provisioning, regulating, supporting and cultural.

Farm bill
The federal omnibus multiyear legislation that governs an array of agricultural and food programs.

Farmers' market
A food market at which local farmers sell fruits and vegetables and often meat, cheese and bakery products directly to consumers.

Famine
A drastic, wide-reaching food shortage.

Fast and convenient food
Food that is purchased prepared (i.e. at a drive-through restaurant), or is quick and easy to prepare.

Food
A substance (typically of plant or animal origin) that contains or consists of carbohydrates, fats, proteins, vitamins and/or minerals, that people or animals eat or drink, or that plants absorb, to sustain life, provide energy and enable growth.

Food access
Access by individuals to adequate resources for acquiring appropriate foods for a nutritious diet.

Food environment
A collection of physical, biological and social factors that affect the eating habits and patterns of an individual or a group of individuals.

Food justice
The right of communities to produce, distribute, access and eat healthy and culturally appropriate food, regardless of race, class, gender, ethnicity, citizenship, ability or religion.

Food processing
The transformation of raw ingredients into food, by physical or chemical means, or the action of changing a food's structure, composition, character or condition.

Food provisioning
The providing or supplying of food.

Food safety
Handling, preparation and storage of food in ways that prevent foodborne illness.

Food security
The state of having reliable access to a sufficient quantity of affordable, safe and nutritious food.

Food sovereignty
The right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems.

Food supply chain
The path food follows from production to disposal or reincorporation; may include steps such as storage, processing, distribution, packaging, marketing, retailing, preparing, consuming and disposing.

Food system
All processes, entities and activities involved in keeping us fed; including inputs and outputs and influencing environments. All of these pieces together form a food system, interacting, interrelating, and oftentimes acting interdependently to function together as a complex, unified whole. The term "food system" is frequently used in discussions about nutrition, food, health, community and economic development, and agriculture.

Food web
A system of interlocking and interdependent food chains.

Foraging and gathering
Searching for wild food resources and collecting them for consumption.

Fossil fuels
Carbon-rich fuel formed from the remains of ancient animals and plants. Examples include coal, oil and natural gas.

Fuel supply
Aggregate of substances that are burned or consumed by some means to produce energy. Examples of fuels include coal, food and wood.

Gathering and hunting
Obtaining food primarily from wild plants and animals (see foraging definition), in contrast to through agriculture.

Genetically modified organism (GMO)
Any organism whose genetic material has been altered in such a way that does not occur naturally, using genetic engineering techniques.

Global food system
The largest scale food system model; referring to all food systems components and their interrelationships worldwide.

Globalization
A process of interaction and integration among the people, economies and governments of different nations, driven by international trade and investment and aided by information technology.

Great Depression
A severe, worldwide economic crisis and period of low business activity, roughly beginning with the stock-market crash in October 1929 and continuing through most of the 1930s.

Greenhouse gas emissions
The emission into the earth's atmosphere of any of various gases, especially carbon dioxide, that contribute to the greenhouse effect.

Habitat loss
The inability of the species and/or ecological communities naturally occurring in an area to exist in that area, due to the habitat being damaged or destroyed.

Health care industry
An aggregation of sectors within the economic system that provides goods and services to treat patients with various forms of medical care.

Health system
The organization of people, institutions, and resources that deliver health care services to meet the health needs of target populations.

Healthy food
Fresh, nutritious, culturally appropriate food, grown with care for the well-being of the land, workers and animals.

Homogenized
Made uniform or similar, as in composition or function.

Hypoxia
Deficiency in the amount of oxygen in a biotic environment.

Industrial agriculture
The system of chemically intensive food production, featuring a low fallow ratio and generally high use of inputs such as capital, labor or heavy use of pesticides and fertilizers relative to land area. Characterized by large single-crop farms and animal production facilities.

Industrial Revolution era (1760-1850)
The totality of the changes in economic and social organization that began in England in approximately 1760, and later in other countries, characterized by the replacement of hand tools with power-driven machines, such as the power loom and the steam engine, and by the concentration of industry into large establishments.

Intensive agriculture
Agriculture that uses high amounts of machinery, labor and chemicals to achieve the highest production possible.

Land use
The human use of land, involving the management and modification of natural environments or wilderness into built environments (such as settlements) and semi-natural habitats (such as arable fields and pastures).

Linear
Progressing from one stage to another in a single series of steps; sequential.

Malnutrition
Lack of proper nutrition, due to inadequate or unbalanced intake of nutrients or their impaired assimilation or utilization.

Marketers
Those involved in the process of determining and catering to consumer wants and/or needs, advertising food in an appealing way to consumers.

Nonrenewable energy
An energy resource that is either replenished very slowly or not replenished at all by natural processes. A nonrenewable resource can ultimately be totally depleted or depleted to the point where it is too expensive to extract and process for human use. Fossil fuels are nonrenewable resources.

Nutrient
A substance that provides nourishment essential for growth and the maintenance of life.

Obesity
A condition in which excess body fat has accumulated to the extent that it may have adverse effects on health.

Permaculture
The use of ecology as the basis for the conscious design and maintenance of agriculturally productive systems which have the diversity, stability, and resilience of natural ecosystems.

Pesticide
A substance used for destroying insects or other organisms that are harmful to cultivated plants or to animals.

Policymaker
A person responsible for making policy (a course or principle of action), especially in government.

Political system
A set of institutions, interest groups (such as political parties), and lobby groups, and the relationships between those institutions and the political norms and rules that govern their functions.

Politician
A person who is professionally involved in politics, especially as a holder of or a candidate for an elected office.

Preserving
To prepare food so as to resist decomposition or spoiling, usually by cooking with sugar, pickling, canning or freezing.

Processors
Those involved in food processing (see definition), generally as a way to make food available at times or places that it might not otherwise be.

Producers
Those who create and grow food.

Public health
The health of a population as a whole, especially as monitored, regulated and promoted by the state.

Renewable energy
An energy resource that can be quickly replenished. Some renewable resources, such as solar energy, will always be available no matter how they are used. Others, such as wood, can be depleted when their rate of use exceeds their rate of replacement.

Resilient
Able to withstand, adapt to, or recover quickly from difficult conditions.

Runoff
The draining away of water (or substances carried in it) from the surface of an area of land, a building or structure, etc.

Socioeconomic factors
The social and economic experiences and realities (education level, income level, occupation, place of residence, etc.) that help mold one's personality, attitudes and lifestyle.

Soil
The unconsolidated mineral or organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants, provides habitat, and acts as a dynamic and complex living ecosystem.

Soil compaction
Soil particles are pressed together, reducing pore space, reducing the rate of water infiltration and drainage.

Soil fertility
Capacity of a soil to provide plants with essential nutrients.

Subsidy
A sum of money granted by a government or a public body to assist an industry or business so that the price of a commodity or service may remain low or competitive.

Supply and demand
The amount of a commodity, product or service available and the desire of buyers for it, considered as factors regulating its price.

Sustainability
Creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations.

Sustainable development
Economic development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable food system
Of any scale, meets existing food and nutrition needs without compromising the ability of future food systems to meet the needs of future generations.

Synthetic fertilizers
Chemically derived plant nutrients such as nitrates, phosphates and potassium applied to the soil to restore fertility and increase crop yields.

Systems theory/science/thinking
Studying systems, their parts, principles, influencers and interactions.

Topsoil erosion
Loss or removal of the fertile upper layer of the soil faster than the soil forming processes can replace it, often resulting in land infertility, flooding and/or desertification.

Values
A person's principles or standards of behavior; one's judgment of what is important in life.

Waste management
The process involved in dealing with the generation, prevention, characterization, monitoring, treatment, handling, reuse, and residual disposition of waste from humans and other organisms.

Water cycles
The cycle of processes by which water circulates between the earth's oceans, atmosphere and land, involving precipitation, drainage in water bodies, and return to the atmosphere by evaporation and transpiration.

Wealth disparities
Unequal distribution of financial assets among a population.

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