Unit 7

Soybeans are harvested at Fartura Farm, in Brazil's Mato Grosso state. Brazil is the second largest soy producer worldwide.

FOOD FOR ALL

GOALS

IN THIS UNIT, YOU WILL:

- Read about ways to feed a growing global population.
- Learn how food production and delivery systems affect cities.
- Explore ways to change your relationship with food.

THINK AND DISCUSS

1. Think about the food that you ate today. Do you know how or where it was produced?
2. What effects might food production have on the environment?

Lesson A

PRE-READING

A. **Look at the photos on the right and on the previous page, and read the captions. Then discuss the questions below with a partner.**

1. What food is being produced in each photo?

2. What do you think are the differences between large-scale and small-scale farming methods?

B. **Read the title and introduction on this page. Then note your answers to the following questions.**

1. Who do you think are the "nine billion"?

_____

2. What are the possible challenges of feeding these nine billion?

_____

_____

3. Why might the author think that "food poses one of the biggest dangers to the planet"?

_____

_____

_____

C. **Read the headings on page 108. What kind of information do you think this section will contain?**

_____

_____

FEEDING NINE BILLION

BY JONATHAN FOLEY,
National Geographic

When we think about threats to the environment, we tend to picture cars and smokestacks—not dinner. But the truth is, our need for food **poses** one of the biggest dangers to the planet.

1 Agriculture is among the greatest contributors to global warming, **emitting** more greenhouse gases than all our cars, trucks, trains, and airplanes combined—largely from methane released by cattle and rice farms, nitrous oxide from fertilized fields, and carbon dioxide from the cutting of rain forests to grow crops or raise livestock. Farming is the thirstiest user of our precious water supplies and a major polluter, as runoff from fertilizers and manure disrupts fragile lakes, rivers, and coastal ecosystems across the globe. Agriculture also **accelerates** the loss of biodiversity: As we've

Small farms play a big role in feeding the world, particularly in the developing world. *(Left)* Frank Reese raises turkeys on his farm in Lindsborg, Kansas, U.S.A. *(Middle)* Mariam Kéita harvests peanuts on a farm in Siby, Mali. *(Right)* High up in the Peruvian mountains, Estela Cóndor grows potatoes to sell at market.

cleared areas of grassland and forest for farms, we've lost crucial habitat, making agriculture a major driver of wildlife extinction.

2 The environmental challenges posed by agriculture are huge, and they'll only become more pressing as we try to meet the growing need for food worldwide. We'll likely have 2 billion more mouths to feed by mid-century—more than 9 billion people. But sheer population growth isn't the only reason we'll need more food. The spread of **prosperity** across the world, especially in China and India, is driving an increased demand for meat, eggs, and dairy, boosting pressure to grow more corn and soybeans to feed more cattle, pigs, and chickens. If these trends continue, the double whammy of population growth and meat-and-dairy-intensive diets will require us to roughly double the amount of crops we grow by 2050.

3 I was fortunate to lead a team of scientists who confronted this simple question: How can the world double the availability of food while **simultaneously** cutting the environmental harm caused by agriculture? After analyzing reams of data on agriculture and the environment, we proposed five steps that could solve the world's food **dilemma**.

4 Taken together, these five steps could more than double the world's food supplies and dramatically cut the environmental impact of agriculture worldwide. But it won't be easy. These solutions require a big shift in thinking. For most of our history, we have been blinded by the imperative of more, more, more in agriculture—clearing more land, growing more crops, using more resources. We need to find a balance between producing more food and sustaining the planet for future generations.

STEP ONE: FREEZE AGRICULTURE'S FOOTPRINT

5 For most of history, whenever we've needed to produce more food, we've simply cut down forests or plowed grasslands to make more farms. We've already cleared an area roughly the size of South America to grow crops. To raise livestock, we've taken over even more land—an area roughly the size of Africa. Agriculture's footprint has caused the loss of whole ecosystems around the globe, including the prairies of North America and the Atlantic forest of Brazil, and tropical forests continue to be cleared at alarming rates. But we can no longer afford to increase food production through agricultural expansion. Trading tropical forest for farmland is one of the most destructive things we do to the environment, and it is rarely done to benefit the 850 million people in the world who are still hungry.

STEP TWO: GROW MORE ON FARMS WE'VE GOT

6 Starting in the 1960s, the green revolution increased **yields** in Asia and Latin America using better crop varieties and more fertilizer, irrigation, and machines—but with major environmental costs. The world can now turn its attention to increasing yields on less productive farmlands—especially in Africa, Latin America, and eastern Europe—where there are "yield gaps" between current production levels and those possible with improved farming practices. Using high-tech, precision farming systems, as well as approaches borrowed from organic farming, we could boost yields in these places several times over.

STEP THREE: USE RESOURCES MORE EFFICIENTLY

7 Organic farming can also greatly reduce the use of water and chemicals—by incorporating cover crops and compost to improve soil quality, conserve water, and build up nutrients. Many farmers have also gotten smarter about water, replacing **inefficient** irrigation systems with more **precise** methods, like subsurface drip irrigation. Advances in both conventional and organic farming can give us more "crop per drop" from our water and nutrients.

STEP FOUR: SHIFT DIETS

8 It would be far easier to feed 9 billion people by 2050 if more of the crops we grew ended up in human stomachs. Today only, 55 percent of the world's crop calories feed people directly; the rest are fed to livestock (about 36 percent) or turned into biofuels and industrial products (roughly 9 percent). Though many of us consume meat, dairy, and eggs from animals raised on feedlots, only a fraction of the calories in feed given to livestock make their way into the meat and milk that we consume. For every 100 calories of grain we feed animals, we get only about 40 new calories of milk, 22 calories of eggs, 12 of chicken, 10 of pork, or 3 of beef. Finding more efficient ways to grow meat and shifting to less meat-intensive diets—even just switching from grain-fed beef to meats like chicken, pork, or pasture-raised beef—could free up substantial amounts of food across the world.

STEP FIVE: REDUCE WASTE

9 An estimated 25 percent of the world's food calories and up to 50 percent of total food weight are lost or wasted before they can be consumed. In rich countries, most of that waste occurs in homes, restaurants, or supermarkets. In poor countries, food is often lost between the farmer and the market due to **unreliable** storage and transportation. Consumers in the developed world could reduce waste by taking such simple steps as serving smaller portions, eating leftovers, and encouraging cafeterias, restaurants, and supermarkets to develop waste-reducing measures. Of all of the options for boosting food availability, tackling waste would be one of the most effective.

Jonathan Foley directs the Institute on the Environment at the University of Minnesota.

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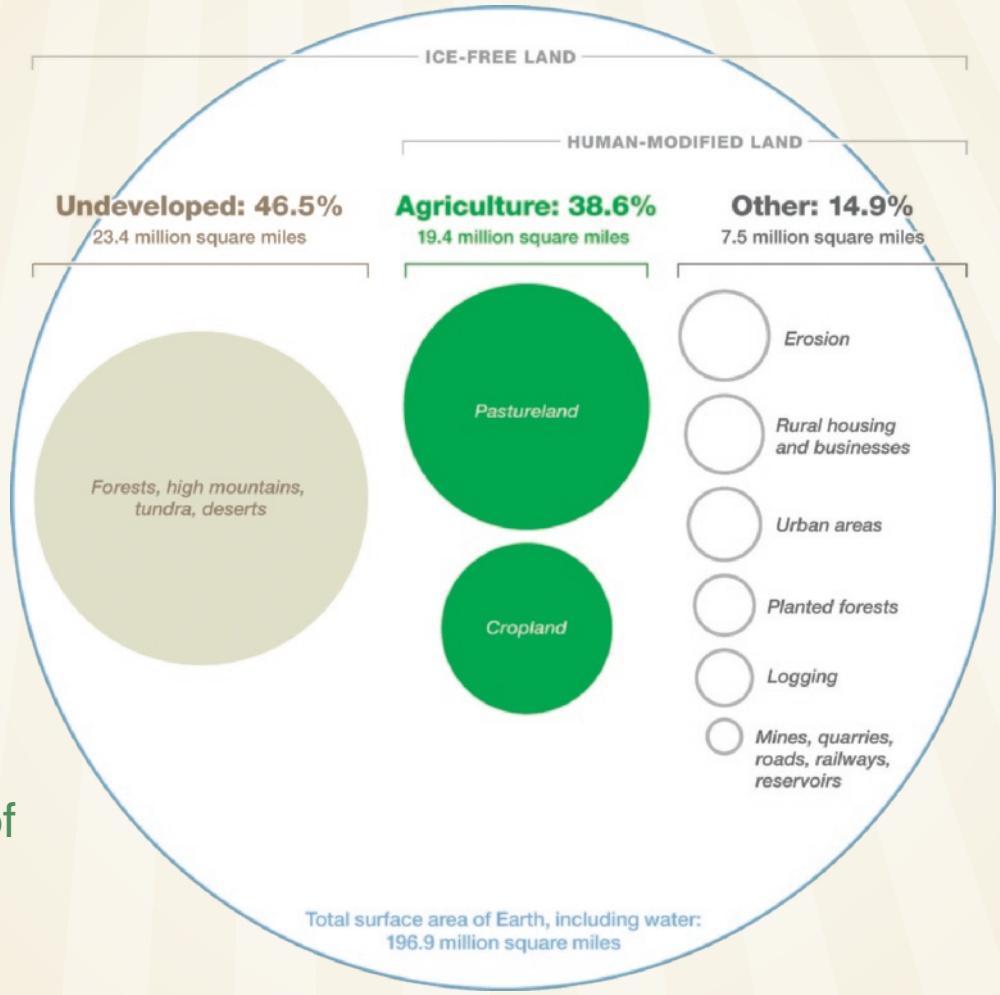
compost: *n.* decaying organic material that is used as a plant fertilizer

subsurface drip irrigation: *n.* an underground watering system in which buried tubes provide small amounts of water directly to the roots of plants

Agriculture's Footprint

Farming of both livestock and crops is the largest human endeavor on Earth, using more than 38 percent of ice-free land. Our next largest impact: erosion caused by agriculture, building, logging, and mining.



> "We've already cleared an area roughly the size of South America to grow crops."

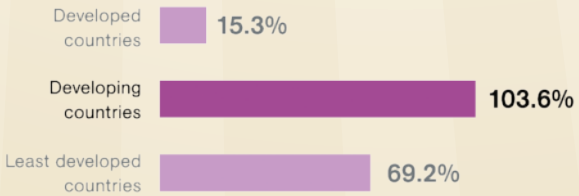
A World Demanding More

By 2050, the world's population will likely increase by about **35 percent.**

To feed that population, crop production will need to **double.**

Why? Production will have to far outpace population growth as the developing world grows prosperous enough to eat more meat.

Increase in daily protein demand
Per capita by 2050



GETTING THE MAIN IDEAS

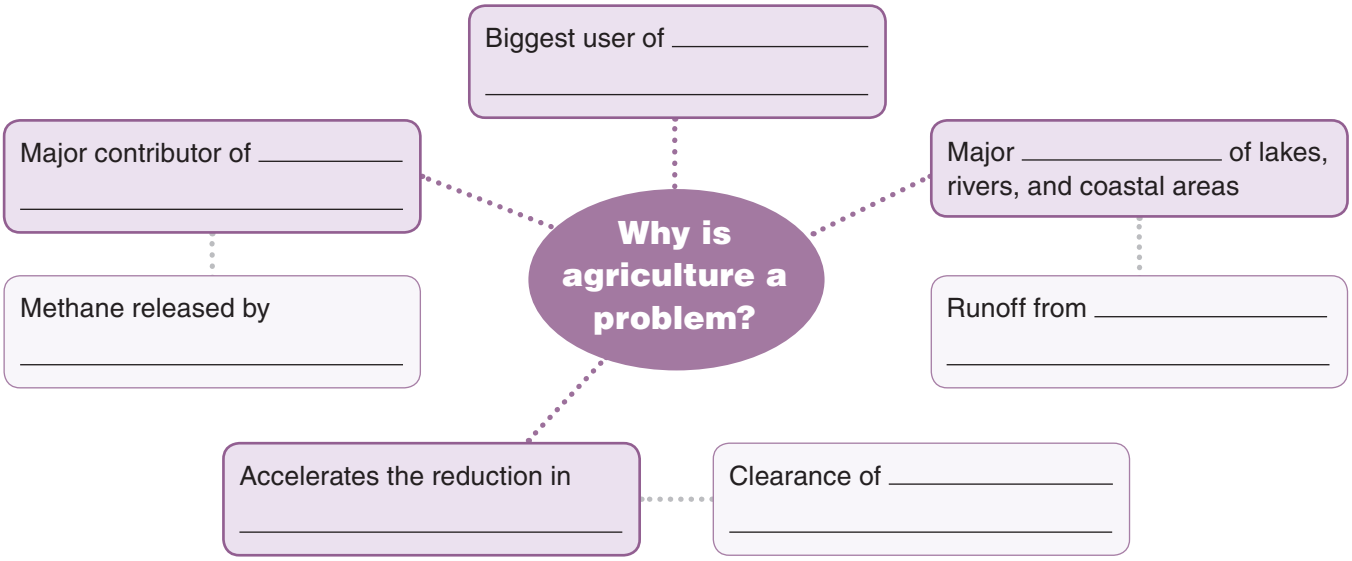
Choose the best phrase to complete the overall main idea of the reading passage.

____ may solve the problem of providing enough food for the world and reduce environmental stress at the same time.

1. Prosperity and a growing population
2. Changing diets and the way we approach agriculture
3. Investing in advanced technology for meat production.

UNDERSTANDING PROBLEMS

A. Paragraph 1 explores some of the problems associated with agriculture. Complete the concept map below.



B. Use information from paragraph 2 and the infographic "A World Demanding More" on page 109 to summarize the environmental challenges posed by agriculture.

1. We'll need to feed an additional ____ people by 2050.
   a. 2 billion **b.** 7 billion **c.** 9 billion
2. Rises in global wealth will ____ by 2050.
   a. mean higher demand for meat, which requires more agricultural resources
   b. cause prices for crops to rise, which will result in much higher food prices
   c. lead to people worldwide eating more soybeans and corn products
3. Increased wealth and higher population mean we will need to ____ by 2050.
   a. double the number of farms
   b. eat twice as much food
   c. grow twice as many crops

IDENTIFYING SOLUTIONS

Complete the chart about each of Foley's proposed solutions. Use the ideas below.

a. crops
b. efficient
c. existing farms
d. expansion of farmland
e. limited resources like water
f. meat-based diets
g. rain forests and grasslands
h. storage and transportation
i. waste
j. yields

Step	Benefit
1. Stop _____	Prevents destruction of _____
2. Use new technologies to grow more on _____	Increases _____ on farms that are currently not very productive
3. Reduce use of _____	Makes farms more _____
4. Move away from _____	Increases proportion of _____ that feed people rather than animals
5. Improve food _____	Reduces _____

PARAPHRASING INFORMATION

Paraphrasing information—by restating, condensing, or clarifying an author's ideas—can help you to understand it better.

Use the information from the "Understanding Solutions" activity above to paraphrase each of Foley's steps.

Step 1: *The first step is to stop creating new farmland and instead use existing agricultural areas. This will prevent the destruction of rain forests and grasslands.*

Step 2: _____

_____

Step 3: _____

_____

Step 4: _____

_____

Step 5: _____

_____

UNDERSTANDING INFOGRAPHICS

Complete the following summary of the infographic "Agriculture's Footprint" on page 109.

The infographic shows that there is (less / more) developed land than undeveloped land on the Earth's ice-free surface. In fact, only (38.6% / 46.5%) of ice-free land has not been altered by humans. The majority of developed land is used for (agriculture / urban areas). The land needed for pasture and crops is more than (double / half) the size of other human-modified land. The next largest impact on the land is (erosion / logging) caused by a variety of industries. While development of urban areas has had a significant impact on the world's surface, its impact on land use is (less / greater) than that of rural housing and businesses.

BUILDING VOCABULARY

A. Complete the paragraph with the words below. You may need to change the forms of the words.

emit **pose** **prosper** **simultaneously** **yield**

In "Feeding Nine Billion," Jonathan Foley points out that the appetite for meat is growing as the developing world enjoys greater _____(1). While increased wealth benefits everyone, eating more meat _____(2) certain problems. For example, beef production, which _____(3) about 18 percent of all greenhouse gases worldwide, is a significant contributor to climate change. Currently, global agreements to reduce greenhouse gases do not require countries to count emissions from agriculture in their emission-reduction plans. This is a benefit to nations that are just emerging from poverty. However, as Foley explains, all nations must take a hard look at the way they produce food. The reason is that increasing agricultural _____(4) to feed a growing population could have a serious impact on the environment. The good news, though, is that there are several steps we can take right now to make food production more sustainable. Eating less meat is one way to accomplish this, while _____(5) adopting farming methods that are less stressful on the environment.

B. Complete the sentences with the correct definitions of the words in bold.

1. If you are in a **dilemma** about something, you are faced with a ____ between two alternatives.
   a. risk of choosing **b.** difficult choice
2. If a method is more **precise**, it's ____.
   a. more common **b.** more accurate
3. If a delivery system is **unreliable**, it's ____.
   a. not dependable **b.** not healthy
4. If wealth **accelerates** meat consumption, it ____.
   a. causes it **b.** speeds it up
5. If an agricultural system is **inefficient**, it does not ____.
   a. use resources in the best way **b.** cost a lot of money to use

C. Choose the word that best collocates with each of the words in bold.

1. **emit** ____
   a. production **b.** light **c.** benefits
2. **pose** ____
   a. a danger **b.** a plan **c.** an impact
3. **unreliable** ____
   a. meat **b.** population **c.** service
4. **inefficient** ____
   a. use **b.** cause **c.** benefit

GETTING MEANING FROM CONTEXT

A. Find the phrases in bold in the passage. Then choose the meaning below that is the closest to the meaning in the passage.

1. Paragraph 1: **a major driver** (of something)
   a. a main result
   b. a significant cause
   c. a source of competition
2. Paragraph 4: **a big shift in thinking**
   a. a large improvement in understanding
   b. a great deal of hard work
   c. a major change in the way of viewing something

B. Complete the sentence with the correct phrase from Exercise A.

The food processing industry now accounts for 9 to 10 percent of India's GDP (Gross Domestic Product) and has become _____ of India's economic growth.

CRITICAL THINKING

Evaluating. Discuss these questions with a partner: Which of Foley's five steps do you think would be the hardest to achieve? Which would be the easiest? Why?

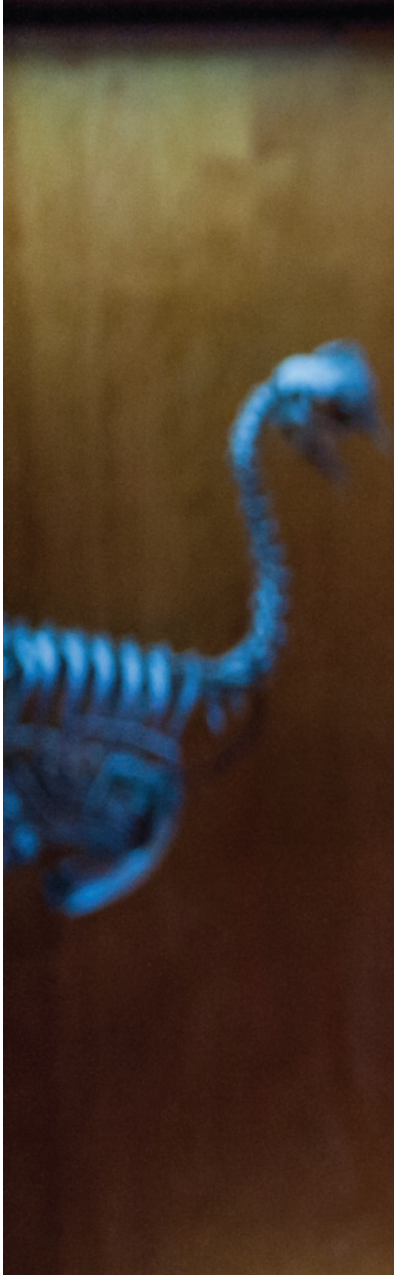
EXPLORE MORE

Read more about the future of food at nationalgeographic.com. Share what you learn with the class.

Lesson B

TEDTALKS

HOW FOOD SHAPES OUR CITIES



CAROLYN STEEL, Food urbanist, TED speaker

We can tell a lot about the historical role of food in people's lives by studying the history of cities. In her book, *Hungry City: How Food Shapes Our Lives*, British architect Carolyn Steel looks at how cities were organized around the ways that people produced food and then got it to their tables.

To illustrate this, Steel describes old London and shows how ancient food routes shaped the city of today. Street names like Bread Street and Poultry Street tell us a lot about what was happening in these parts of the city 300 years ago. In fact, she says, "If you were having Sunday lunch, the chances were it was mooing or bleating outside your window about three days earlier."

However, in the 20th century, Londoners—and other city dwellers—began driving their cars to suburban supermarkets to get their food, and as Steel points out, "This is the moment when our relationship, both with food and cities, changes completely." Steel feels that we are less connected today with our food and would like to reinvigorate the presence of food in cities. In her 2009 TED Talk, she proposes some ways to accomplish this.

dwellers: *n.* people who live in a place

reinvigorate: *v.* to make energetic or strong again

Carolyn Steel's **idea worth spreading** is that we really are what we eat. Food is a powerful tool that we should use to create the world we want to live in.

In this lesson, you are going to watch segments of Steel's TED Talk. Use the information about Steel on page 114 to answer each question.

1. What does Steel think we can learn by looking at how cities are organized?

2. How can street names tell us about the food Londoners ate 300 years ago?

3. How is the modern relationship with food different, according to Steel?

PART 1

AN ESCALATING PROBLEM

PREDICTING

In this segment of Carolyn Steel's talk, she discusses changes in food production and consumption. How do you think these areas will change between now and 2050? Complete the sentences and watch (▶) the segment to check your ideas.

1. About _____ of the world's annual grain crop goes to feeding animals instead of feeding people today.

a. a quarter **b.** a third **c.** a half

2. The number of people living in cities could _____ by 2050.

a. double **b.** triple **c.** quadruple

3. There will likely be _____ in the amount of meat we will be consuming in 2050.

a. no change **b.** a slight increase **c.** a significant increase

4. Today, about _____ of all food produced in the U.S. is thrown away.

a. 10 percent **b.** 25 percent **c.** 50 percent

UNDERSTANDING MAIN IDEAS

Choose three sentences that summarize Steel's main ideas in this segment.

____ **1.** The process of feeding a large city is truly amazing, but we hardly ever think about it.

____ **2.** Although most of us now live in cities, we are still dependent on the natural world.

____ **3.** It has recently become very difficult to feed the entire population of London.

____ **4.** Cities in the Western world are generally growing faster than in other parts of the world.

____ **5.** As more people change to a meat-based diet, natural landscapes are being transformed.

CRITICAL THINKING

Inferring. Discuss your ideas with a partner.

Why does Steel show the photo of the soybean fields (see pages 104–105)? How does it support her main ideas?

ANALYZING ARGUMENTS

A. Analyze how Steel supports her argument that the Western diet is unsustainable. First, read the following excerpts and use the amounts to complete the missing numerical information.

billion **half** **19 million** **6 billion** **ten** **third** **twice**

« . . . a _____ of the annual grain crop globally now gets fed to animals rather than to us human animals. And given that it takes _____ times as much grain—to feed a human if it's passed through an animal first, that's not a very efficient way of feeding us. »

« . . . By 2050, it's estimated that _____ the number of us are going to be living in cities. And it's also estimated that there is going to be twice as much meat and dairy consumed. . . . _____ hungry carnivores to feed, by 2050. That's a big problem. »

« . . . _____ hectares of rain forest are lost every year to create new arable land. . . . _____ the food produced in the U.S.A. is currently thrown away. . . . A _____ of us are obese, while a further billion starve. None of it makes very much sense. »

hectares: *n.* units of measure equal to 2.471 acres or 10,000 square meters

arable: *adj.* fit for farming

B. Compare the ideas in Foley's essay in Lesson A with those in Steel's talk. Note your answers and then discuss the questions with a partner.

1. What information in Steel's talk supports the ideas in Foley's essay?

_____

2. What ideas would each person agree on?

_____

3. In what ways are their arguments different?

_____

PART 2

RECONNECTING WITH FOOD

UNDERSTANDING MAIN AND SUPPORTING IDEAS

A. In the next part of her talk Steel compares our relationship to food now and in the past. Read the excerpt below, and predict the missing words or phrases. Then watch (▶) the next segment to check your ideas.

"Here we have food—that used to be the _____, the social core of the city—at the periphery. It used to be a social event, buying and _____ food. Now it's anonymous. We used to cook; now we just add _____, or a little bit of an egg if you're making a cake . . . We don't _____ food to see if it's OK to eat. We just read the back of a label on a packet. And we don't value food. . . . And instead of valuing it, we _____ away."

B. Steel makes the case for a new type of society, which she calls *Sitopia*. What characteristics of Sitopia does she mention? Check (✓) five characteristics.

____ Food is at the center of family life.

____ It's based around independent city-states.

____ People take time for food, and celebrate it.

____ Markets sell food that is fresh and grown locally.

____ There are few supermarkets.

____ Community projects educate children about food.

____ Cities and nature are seen as part of the same framework.

C. Can you think of any examples of Sitopia in your own city or town? Share your ideas with a partner.

EXPLORE MORE

Find out more about how food shapes cities. Watch Steel's full talk at TED.com. How did ancient Rome feed its citizens? Share what you learn with the class.

Project

Chef and author Nick Saul in the Green Barn—a food community center he built where residents can grow, buy, and eat their own food in Toronto, Canada.

A. Work with a partner. You are going to propose ways that people in your area can create a Sitopia.

1. Go to TED.com and get some ideas from the following TED Talks.
   - Ron Finley, "A guerilla gardener in South Central L.A."
   - Pam Warhurst, "How we can eat our landscapes"
   - Britta Riley, "A garden in my apartment"
   - Roger Doiron, "My subversive (garden) plot"
   - Mark Bittman, "What's wrong with what we eat"

2. With your partner, answer these questions.
   - What types of food-related activities are realistic for your area? Consider weather, available space, the interests of the people in your community, and so on.
   - What are some possible locations for these activities?
   - How will these activities help people in your community reconnect with food?
   - How will these activities help the environment?
   - What other benefits will these activities have?

B. Use your information to create a two-minute presentation on your proposal. You can use maps, photos, and video to explain your information.

C. Work with two other pairs.

- Present your proposals.
- As you listen, take notes.
- At the end, review your notes.
- Have a class discussion. Which activities are the most realistic? Which have the most benefits? Do you have any suggestions for improving your classmates' proposals?

EXPLORE MORE

Learn more about how people in your community are changing their relationships with food. Has access to fresh food improved in recent years? Are there any signs of urban agriculture? Share what you learn with the class.