**The relationship between agriculture and the economy**

**Pillar 6 B. Make a connection between the growing world population and the need for increased agricultural production**

 (9th – 12th Grade)

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| **Website**: <http://www.unesco.org/education/tlsf/mods/theme_c/mod15.html>, <http://web.mit.edu/12.000/www/m2015/2015/hydro_agriculture.html> **Hands On:** <http://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=540&grade=9&author_state=0>  |

**Global Food Security**

**Purpose**

Students will explore the causes of hunger, both domestically and globally; evaluate potential solutions for solving world hunger; and forecast the impact of a growing world population on current food supplies.

**Materials**

* [*World Food Programme Hunger Map*](http://documents.wfp.org/stellent/groups/public/documents/communications/wfp275057.pdf)
	+ A poster-sized, laminated copy of this map is [available for purchase](https://utah.agclassroom.org/cart/Details.cfm?ProdID=203&category=0)

**Activity 1**

* *Food Security Handout: Survey* (1 copy)
* *Food Security Handout: Results* (1 copy)
* *Food Security Handout: Cards* (print 1 sheet; cut out cards)
* Internet access for each student OR for instructor (to project for class)
* [*Map the Gap*](http://map.feedingamerica.org/county/2013/overall) website
* [*Food Access Research Atlas*](http://www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas.aspx)

**Activity 2**

* [*A Five-Step Plan to Feed the World*](http://www.nationalgeographic.com/foodfeatures/feeding-9-billion/) National Geographic article
* [*Revolutionizing the Way We Grow Food*](http://video.nationalgeographic.com/video/ng-live/151027-harper-technology-food-lecture-nglive) National Geographic Live video

**Activity 3**

* [*Green Revolution*](http://www.encyclopedia.com/topic/Green_Revolution.aspx) article
* [*The Next Green Revolution*](http://www.nationalgeographic.com/foodfeatures/green-revolution/) article
* [*Food in a Future of 10 Billion*](http://agricultureandfoodsecurity.biomedcentral.com/articles/10.1186/s40066-015-0031-7) article
* [*Consequence Wheel/Future Wheel*](http://www.emergentfutures.com/wpdl/Emergent%20Futures%20Consequence%20Wheel%20Tool%20Download.pdf) reference
* Sheets of drawing paper
* Markers or colored pencils

**Essential Files (maps, charts, pictures, or documents)**

* [Food Security Handout: Survey](http://naitc-api.usu.edu/media/uploads/2017/01/09/Food_Security_Handout_Survey_1.pdf)
* [Food Security Handout: Results](http://naitc-api.usu.edu/media/uploads/2017/01/09/Food_Security_Handout_Results_1.pdf)
* [Food Security Handout: Cards](http://naitc-api.usu.edu/media/uploads/2017/01/09/Food_Security_Handout_Cards_1.pdf)

**Vocabulary**

**Green Revolution:** beginning in the mid-20th century, a large increase in crop production in developing countries was achieved by the use of fertilizers, pesticides, and high-yield crop varieties

**Millennium Development Goals:** endorsed by the United Nations in September 2000, eight measurable goals were declared as a commitment to build a safer, more prosperous, and equitable world with a target date of 2015

**Sustainable Development Goals:** adopted in September 2015, this set of 17 goals seeks to end poverty, protect the planet and ensure prosperity for all as part of a new sustainable development agenda; each goal has specific targets to be achieved over the next 15 years

**Famine:** when people face a complete lack of access to food and other basic needs and experience mass starvation, death, and destitution

**Food desert:** defined as urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food

**Food insecurity:** a situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life

**Food security:** when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food which meets their dietary needs and food preferences for an active and healthy life

**Hunger:** synonymous with chronic undernourishment; defined by the Food and Agriculture Organization as consuming less than a minimum level of kilocalories

**Malnutrition:** a condition resulting when a person’s diet does not provide adequate nutrients for growth and maintenance

**Undernourishment:** an indicator of inadequate dietary energy that is assessed at the population level using national food balance sheets to determine the supply of dietary energy available to a given population and modeling of how that energy is distributed across the population

**Did you know? (Ag Facts)**

* With proper tools and investment, agriculture output in Africa could increase over 200% by 2030.1
* In countries around the world, cost is the primary factor in food choice.2
* Malnutrition affects every country on Earth and more than one-quarter of the world’s population.3
* The increasing demand for affordable meat, milk, and eggs means the world will need 60% more animal-sourced foods.4

**Background Agricultural Connections**

What is food security? The Food and Agriculture Organization (FAO) of the United Nations defines **food security** as all people, at all times, having physical, social, and economic access to sufficient, safe, and nutritious food which meets their dietary needs and food preferences for an active and healthy life.

**Interest Approach – Engagement**

1. Project the [*World Food Programme Hunger Map*](http://documents.wfp.org/stellent/groups/public/documents/communications/wfp275057.pdf) for the class to see.
2. On poster paper or a whiteboard, write “WHY?”
3. Engage students in a discussion as to why **undernourishment** is present in a particular country. The map shows the distribution of the global population that is suffering from inadequate dietary energy.
4. Invite students to write their answers to the question. Factors to be considered include geographical location, politics, the state of natural resources, conflict, education, technology, poverty, food distribution, and natural disasters.

**Procedures**

**Activity 1: Household Food Security Activity**

*Note: This activity replicates a 2015 survey conducted by USDA regarding food security in US households. Although the “responses” indicated by the response cards are based on fact, this activity does not imply that the responses are specific to your students. Please use your discretion in conducting this activity, especially in cases where the results may be too close to reality for your students.*

1. “For this activity, one of you will ask questions from an actual US government survey designed to measure levels of household food security.”
	* Ask for a volunteer.
	* Give them the *Food Security Handout: Survey*.
2. “One of you will interpret the results of the survey.”
	* Ask for a second volunteer.
	* Give them the *Food Security Handout: Results*.
3. “Some of you will respond to the survey questions based on answers given to you on note cards. Your collective responses will reflect the state of food security in the United States., as it was measured in 2010. Because questions of food security are very personal, we won’t ask you to respond on behalf of your actual household.”
	* Ask for 20 volunteers. Distribute the *Food Security Handout: Cards* among these students.
	* Each student represents roughly 6 million US households. Have these students stand in line, facing the same direction.
	* If there are more cards than students, place each extra card on the ground, in line with the standing students, to represent the remaining households.
	* Have the first volunteer proceed with the survey. In response to each question, students will remain in place or take one or two steps forward to illustrate their responses.
	* Once the survey is complete, have the second volunteer interpret the results (see *Food Security Handout: Results* for details).
4. As individual students OR as a class, go to the [*Map the Gap*](http://map.feedingamerica.org/county/2013/overall) website and scroll to the Food Insecurity Rates map.
5. Assign a county to each student to explore, OR explore the county in which the school is located. Ask the following questions of students:
	1. What is the food insecurity rate in the county?
	2. What is the average cost of a meal?
	3. In order to meet the food needs of the insecure population in the county, how much additional money is required in this county?
6. Show students the [*Food Access Research Atlas*](http://www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas.aspx).
7. Zoom in on the map to identify the nearest food deserts to the town in which your school is located. Select the Low Income & Low Access Layers and the Component Layers to identify the areas of low income and access near your school.
8. Lead a class discussion about hunger, food insecurity, low income, and low food access in your town, county, and state. What factors influence the food insecurity rates?

**Activity 2: Feeding the World**

1. Assign students to read [*A Five-Step Plan to Feed the World*](http://www.nationalgeographic.com/foodfeatures/feeding-9-billion/) by National Geographic.
2. Instruct them to write pro or con responses to the five-step plan for feeding a world of 9 billion people.
3. Lead a group discussion in which students share their written responses.
4. Show students the video [*Revolutionizing the Way We Grow Food*](http://video.nationalgeographic.com/video/ng-live/151027-harper-technology-food-lecture-nglive) (10:20 duration). Instruct students to note Caleb Harper’s solutions for growing enough food to feed the world’s increasing population.
5. Lead a class discussion, asking students to evaluate the feasibility of Mr. Harper’s solutions.

**Activity 3: The Future of Food**

1. Assign the following readings to students prior to class:
	* [*Green Revolution*](http://www.encyclopedia.com/topic/Green_Revolution.aspx)
	* [*The Next Green Revolution*](http://www.nationalgeographic.com/foodfeatures/green-revolution/)
	* [*Food in a Future of 10 Billion*](http://agricultureandfoodsecurity.biomedcentral.com/articles/10.1186/s40066-015-0031-7)
2. Using the information from [*Consequence Wheel/Future Wheel*](http://www.emergentfutures.com/wpdl/Emergent%20Futures%20Consequence%20Wheel%20Tool%20Download.pdf) reference, explain to students how to construct a future wheel. It is important to remember that this forecasting technique follows an “if, then” format. “If” this event occurs, “then” this is the result. For example, “if” the population reaches 9 billion by 2050, “then” food shortages will occur. OR, “if” new food production technologies are invented, “then” food shortages will be alleviated. It is possible that both scenarios are included in one future wheel as a result of brainstorming consequences.
3. Divide the class into groups of four students. Assign the topic/issue of “9 Billion Mouths to Feed in 2050” for the center of their future wheels. Give students time to brainstorm as many consequences (“if/then”) as they can create.
4. Each group of students will draw their future wheel and share their future predictions, as time allows.

**Concept Elaboration and Evaluation**

After conducting these activities, review and summarize the following key concepts:

* Production and distribution of food is affected by the relationships between geography, politics, and economics.
* Developed and under-developed countries face both similar and very different economic challenges that affect agriculture and food security.
* The Green Revolution increased agricultural productivity around the world and created significant environmental consequences.

**Enriching Activities**

* Enlist students to plan a service project that addresses hunger issues in your area.
* Review with students the key points in [*Promoting Access to Local, Healthy Food*](http://www.mayorsinnovation.org/images/uploads/pdf/Access_to_Healthy_Local_Food.pdf). Lead a discussion that prompts answers to the question: In regards to food deserts, might local farms help address inequality in access to healthy food?
* If there is a food bank in close proximity to your school, invite an employee or volunteer to speak with your students about hunger and food insecurity in your area.
* Challenge students to draw von Thünen’s Rural Land Use Model for a specific food desert location (use the [*Food Access Research Atlas*](http://www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas.aspx)) and identify the accessible, healthy foods that urban gardens might provide as a solution to the desert.
* Arrange a classroom gallery walk using Peter Menzel’s Hungry Planet posters (see Companion Resources). Instruct students to evaluate the amount of money families spend on food and what foods families eat in different countries. Compare these countries based on their levels of development (economic, social, political, and environmental).
* **Note: This enriching activity was highly recommended by lesson pilot teachers. You may want to incorporate it into your curriculum as time allows.** Show students the documentary, *A Place at the Table* (available on Netflix). Following the viewing, ask students the following questions. Encourage them to consider the geographical, cultural, and social factors involved.
	+ *What facts did you learn about hunger? Which one is the most startling, and why?*
	+ In 2010, Feeding America—the nation’s leading domestic hunger-relief charity—conducted a hunger study in which they found that 23% of the adults interviewed have attended college or a technical school. *What resources or procedures, in addition to education, might help solve hunger issues?*
	+ Eighty-five percent of families that are food insecure have at least one working adult in the household. *Do you find that surprising? Why or why not?*
	+ In the film we learn that in the ‘60s, there was a huge push to end childhood hunger that resulted in free breakfast and lunch programs, senior meal programs, and the expansion of food stamps. As a result, by the late ‘70s, hunger was basically eradicated. *Why do you think hunger has come back as such a pressing issue in our country?*
	+ One in three children born in the year 2000 will develop Type 2 diabetes (formerly called “adult onset”). *What are some of the factors that add to the reasons why diet-related illness is increasing in young people at such an unprecedented level?*

**Suggested Companion Resources**

* [Interactive Map: Staple Food Crops of the World](http://www.agclassroom.org/teacher/matrix/resources.cfm?rid=694) (Poster, Map, Infographic)
* [Nine (+) Infographics That Will Help You Teach Hunger](http://www.agclassroom.org/teacher/matrix/resources.cfm?rid=693) (Poster, Map, Infographic)
* [Population, Sustainability, and Malthus: Crash Course World History video](http://www.agclassroom.org/teacher/matrix/resources.cfm?rid=760) (Multimedia)
* [What Does the World Eat?](http://www.agclassroom.org/teacher/matrix/resources.cfm?rid=690) (Multimedia)
* [World Population History](http://www.agclassroom.org/teacher/matrix/resources.cfm?rid=777) (Multimedia)
* [Hungry Planet Resources from Social Studies School Service](http://www.agclassroom.org/teacher/matrix/resources.cfm?rid=691) (Teacher Reference)
* [FAOSTAT: Food and Agriculture Organization of the United Nations Statistics Division](http://www.agclassroom.org/teacher/matrix/resources.cfm?rid=692) (Website)
* [Hungry Planet Family Food Portraits](http://www.agclassroom.org/teacher/matrix/resources.cfm?rid=703) (Website)

**Sources/Credits**

1. <http://www.mckinsey.com/insights/africa/lions_on_the_move>
2. Elanco Animal Health. International Consumer Attitudes Study. Updated June 2013. Data on File.
3. <http://www.thechicagocouncil.org/sites/default/files/2013_Advancing_Global_Food_Security%283%29.pdf>
4. <http://www.fao.org/news/story/en/item/174172/icode/>
5. <http://www.fao.org/docrep/013/al936e/al936e00.pdf>
6. <http://www.fao.org/3/a-i4646e/index.html>
7. https://www.ers.usda.gov/webdocs/publications/err194/53740\_err194.pdf

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Activity 1 was adapted with permission from [The Johns Hopkins Center for a Livable Future *FoodSpan Food Security Activity*](http://www.foodspanlearning.org/about/).

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