Lesson Three: Food Security as a System

Teacher Information:

**Overarching Question of the Activity:** How robust is our food supply? Is this simple or complex? Would it help to think of this as a system? Why or why not? How do we think about systems?

**NGSS:** HS-LS1A Structure and Function with use of negative and positive feedback loop models, HS-LS2C Ecosystem Dynamics Functioning and Resilience, HS-LS2D Biodiversity and Humans,

**Goal:** to encourage students to look at the topic of food security with a systems approach, using the definition of food security they learned in lesson one and the stakeholders from lesson two.

**Assumptions:**  A) Students have already completed the cell phone network activity and have a working definition of network. B) Students have been through lessons 1 and 2 and have filled out their stakeholder forms. C) You teach students the 6 tools of systems thinking and use the assessment probe in this lesson.

**Introduction:**  Students automatically assume that there is a quick fix or a right answer for every question.In looking at the Stakeholder Sheet, students’ first thought will be to find who is to blame for food insecurity, pin the blame on a group and be done with the issue. This next activity is designed to introduce students to systems thinking and allow students to discover their own new way of looking at the issue of food security and the stakeholders.

**Formative Assessment:** Take a look at the Teacher Notes from Paige Keeley’s Is It a System? assessment probe. Hand out the student worksheet Is It A System? and have students work in small groups to figure out what are systems and what are not. Going through this activity will naturally lead you to a discussion about what is systems thinking and how to use systems thinking to approach the topic of food security.

**Lesson**: See the [www.watersfoundation.org](http://www.watersfoundation.org) website for New Habits of Mind for New Solutions STOP Systems Analysis in Six Steps activity to look at the different models students can use to illustrate a system. Work with students as they walk though The Coffee Crutch story using the iceberg model, and show them the other types of diagram tools we can use to try to analyze a problem. Then ask students to think about the issue of food security. Ask them if they believe this might be a system. We heard the story yesterday as we listened to the Stakeholders explain why they need to be considered when discussing this issue. Then ask students to work the 6 steps around this idea in groups of 4-6 people, with each representing a different stakeholder group. Start with the opening line of the story:

Everyone needs to eat! Does the question of having food security for every living person on the planet have a simple answer? In your group, choose one of the graphic systems tools that you think is the best to use to think about Food Security and answer the question of is this a stable system?.

Turn student groups loose to build their own network map, centered on the concept of food security and stability. Float around the room asking students to show you their cause/effect relationships and encourage them to find further connections by repeating the word “And?” In example, if students suggest to you that climate change is linked to the economy because if the climate changes in an area and crops can no longer be grown there, there is nothing for people to sell, eat or buy, you as the teacher would say, “And?” and encourage those students to think deeper, looking for more connections/cause-effect relationships. Students may then figure out that no money for the local citizen means not being able to get anywhere to find a different job, which leads to greater poverty and therefore greater food insecurity, more reliance on the government and other developed nations, etc.

After your students have exhausted their ideas, ask groups to share out. Once each group has shared out, use their ideas and whole class discussion to build a large class causal loop map. Through class discussion, start to identify as many of the interactions between different nodes of the map and as many positive and negative feedback loops as possible around the concept of food security. The system map will get messy.

Enduring understandings of the class discussion and causal loop diagram:

1. Interactions between stakeholders in a system lead to a complex, dynamic system.
2. Cooperative interactions promote efficiency in the use of energy and matter, while non-cooperation leads to ineffective and inefficient use of resources.
3. There are both positive/negative feedback loops in a system, as well as built in redundancy, to keep it stable. Even with that, there are certain essential nodes that if removed or diminished in any way create tipping points that will cause the system to crash.