

Understanding Objects with Systems Thinking

Description:

By discussing the features of a system, students should begin to link different aspects of our climate and environment as interconnected parts. This lesson will illustrate the interconnectedness of our society through material objects and their connection to the Earth.

Objectives:

- Demonstrate a basic understanding of Earth systems and how humans interact with these systems
- Analyze the origins of their chosen object and how they fit into Earth systems

Vocabulary:

Feedback loop, inputs, lifecycle, systems thinking

Materials:

- Paper, ideally poster sized
- Something to draw with (pens, markers, crayons, paint)
- Optional: computers, laptops, or tablets with internet access

Background Information:

This lesson will approach systems thinking by examining the various inputs required to produce objects and the interconnectedness of these inputs within the greater Earth systems. To imagine this, remember the Law of Conservation of Mass. This scientific rule simply states that mass cannot be created or destroyed. This helps us understand that all things on our planet will

always exist and everything is made up of interconnected particles of mass. When we think about what exists on Earth with the understanding that nothing is ever truly “created” out of thin air, we are presented with a systems thinking concept. This lesson is designed to help illustrate this law and systems thinking as a whole, while emphasizing that both natural and human created objects originate from the same key ingredients that have existed on Earth since the beginning of time.

For more information on systems thinking, please read the background information section of DEP’s [Creating the Systems Thinking Web](#) lesson (the previous lesson in this module).

Method:

- After discussing the concept of systems thinking with the class, give each student a piece of paper and something to draw with.
- Ask students to think about how things are made and the various inputs that go into creating the objects they use everyday. Ask students to choose one object that they have used recently. Ask them to brainstorm the relationship between the resources required to produce this object, the environmental impacts of these resources and in turn this object, and how this might connect to climate change.
- Tell students to draw a web that includes the various materials/inputs required to produce the object, then repeat for the materials/inputs required to produce that object until you can’t simplify further (illustrate the object’s various levels of production by representing the different

inputs used in the process of creation). For example, the sample web on the last page shows an apple→apple tree→soil, water, sunlight, farmers and CO₂.

- If your schedule allows, give students time to research their object.
- Students can also draw the process and materials it took to get the object to the students or the general lifecycle of the object including what happens after we use the object.
- Make sure the drawings include lines connecting the different parts to each other (see sample web below).
- Divide the class into small groups (3-4 students each) and ask students to share their creations with their group and add to their web based on their group's feedback.

Discussion:

- What are some similarities in your webs? Are there any reoccurring inputs (i.e. water, soil or sunlight)?
- Discuss why this is the case? Most, if not all, primary inputs (the first resource needed to produce the object), belong in our natural system (water, soil, sunlight, air) and are all being affected by a changing climate.
- Ask students if they found it difficult to map out their web or if they wanted to choose a more complex object but were not able to identify all of the inputs, then go through each step of that object as a class.
- Why are some objects more difficult to map than others?
- When considering food and the inputs that go into producing it, discuss which food products are healthier for us to consume (i.e. foods with simple inputs that are directly derived from natural systems or processed

foods with many inputs and several production levels).

- How might these objects and our webs be affected by climate change?
- How do our consumption patterns impact natural systems?

Extension:

- Research the ways in which your object will be affected by climate change, and illustrate those impacts on the web itself.
- To continue exploring the lifecycle of objects, use [Talking Trash, a curriculum guidebook](#) created by the Center for Urban Pedagogy on waste systems in NYC. For a direct connection to this lesson, go through Talking Trash's Activity 4, "Trash Timeline", with students.
- Ask students to create a web for a food product of their choice. Map out all of the inputs, and once students get to the last level, with water, soil, sun, seeds, etc., ask students to research the amount needed of each input. Ask students to compare their results with other agricultural goods, like fruits and vegetables, to illustrate how resource intensive certain foods are over others.
- To further demonstrate growth and the origins of objects, plant seeds with students in a school garden or in cups in the classroom and watch them grow. Talk about the inputs needed by the plant and how they fit into the Earth systems discussed in this lesson.

NYC Department of Environmental Protection
educationoffice@dep.nyc.gov

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Sample system:

