Sustainability Personal Inventory

Pre-Lesson for Sustainability Module

Overview:

Students will take a personal inventory of the resources they use on a daily basis and then imagine their lives when those resources are unavailable. After evaluating their choices, they will take another inventory and see if their choices and impact were affected by education.

Lesson Characteristics:

Use the table below for lesson planning purposes:

Time Required	40 minute class period + 20 minute follow up class period
Key Concepts/Terms	Renewable Resources Nonrenewable Resources
Setting	Classroom
Materials	2 worksheets for each student - Personal Baseline Inventory and Sustainability Personal Inventory Chart paper and markers

Standards:

HS-ES S3-4 **Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.* [Clarification Statement: Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).]**

Learning Objectives:

Students will understand how humans interact with natural resources in their everyday life. Students will understand individual impact of energy/water/waste choices. Students will understand the finite supply of nonrenewable resources, and the choices they can make to alleviate the energy problem.

Preparation:

Students will complete the Personal Baseline Inventory worksheet as homework prior to this class.

Background Information:

With increased technology consumption of energy continues to go up in the United States. Using natural, nonrenewable resources such as gas and coal to provide energy for individual needs like charging cell phones, turning on lights, transportation, cleaning water, and disposing of waste is depleting this supply far more quickly than it can be replenished. These nonrenewable resources cannot be replaced within the lifetime of the humans who consume them.

With this knowledge, the energy industry has begun to look to renewable energy sources that are infinite or easily replaced within the human lifespan, such as solar, wind, and hydropower. These resources contribute to a more sustainable system.

The transition from using a known technology of nonrenewable energy supply to using newer technologies that capture renewable energy is progressing, but, in the meantime, if individuals can identify ways to reduce their individual energy consumption (often called carbon footprint) this may lower the demand on the nonrenewable resources. The first way to make this reduction is to become aware of how much an individual uses and find ways to reduce this usage through efficiency or different choices.

Vocabulary:

Terms	**Definitions**
Carbon Footprint	Your carbon footprint is the amount of carbon dioxide and methane gas you release into the environment by consuming energy. Most energy produced in the world is done by burning fossil fuels.
Renewable Resources	Resources that can be used repeatedly because they can be replaced naturally over the average human lifespan.
Nonrenewable Resources	Resources that can not be readily replaced by natural means on a level equal to its consumption.
Sustainability	Avoidance of the depletion of natural resources in order to maintain an ecological balance

Procedure:

Follow the steps in the table below to conduct the activity. **Sentences in bold are suggestions for what an educator might say to students.** *Items in italics are possible student answers to questions.*

Phase	Step	Action
Engage		Students will have completed the Personal Baseline Inventory worksheet as homework. *Alternatively, the Personal Baseline Inventory could be completed in the classroom. In that case, give students a time frame in which to estimate their usage. For example, **Using this worksheet, think about what you used, starting from the dismissal bell yesterday to this moment. Think back and write down every time you used energy, water, transportation, or created waste.** Allow for peer correction when students under or overestimate their personal usage.
Explore/Explain		**From your personal inventory, it should be clear how dependent we are on energy.** **Where does the energy we use come from?** Write down the sources. **Where do each of these come from?** Coal is a fossil fuel mined from the ground then burned to create steam which turns a turbine to produce electricity. Natural Gas is a fossil fuel extracted from the ground then burned to create steam which turns a turbine to produce electricity.

		Oil is a fossil fuel extracted from the ground, and burned to create steam or hot exhaust gases to turn a turbine to produce electricity. Solar power is electricity produced by the sun's radiation exciting an electron in a silicon panel. Wind energy is electricity produced by wind turning a turbine. Hydropower is the electricity produced by water turning a turbine. **What makes something renewable vs nonrenewable?** Clarify definitions (see vocabulary section) and then ask students to **identify which sources are in each category**. Note that **at this time, most of our energy comes from nonrenewable sources that will run out at some point.** According to the US Energy Information Administration, in 2016, renewable energy sources only accounted for 10% of US energy consumption and 15% of US electric generation. https://www.eia.gov/tools/faqs/faq.php?id=92&t=4
Evaluate		**With increases in population and the resulting increases in demands on energy, the time at which those nonrenewable sources will run out is approaching more quickly.** Ask students: **How would your life be different if the amount of energy available to you was dramatically**

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<td>different? What choices would you have to make? What could you do differently?

Hang posters in four corners.Give them each one of the following titles: Energy Consumption, Transportation Emissions, Water Consumption, and Solid Waste. Each poster will then have a section for “24 Hour Usage” and “Reduction of Usage.”

<table>
<tr><td colspan="2">Energy Consumption</td></tr>
<tr><td>24 Hour Usage</td><td>Reduction of Usage</td></tr>
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Explain that these titles are the four areas identified by the National Park Service for targeted reduction.

Divide students into four groups and ask students to take their Personal Baseline Inventory sheet with them to join their group at one of the posters. Each group will estimate how much of each resource they used in 24 hours and write this on the chart. Each group will also brainstorm ways to reduce this amount and write them down in the Reduction of Usage section of the poster. Each group will have 5 minutes at each poster before switching to the next poster.</td>
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<td>Elaborate</td>
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<td>When all groups have completed the rotation, ask students to return to their seats and consider what the other</td>
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		groups suggested for reduction of usage of resources. Highlight some of the suggestions listed on the charts and write down new ideas that come from the group. **Can you make a personal reduction in resource usage in these four areas in the next 24 hours with sustainability in mind?** If they are able to make these choices, it would slow the demand for nonrenewable resources. Ask students to **identify large scale solutions to these resource reductions and write them down.** If changes were made on this scale, it would slow that demand even more. Hand out the Sustainability Personal Inventory worksheet and ask the class to complete over the next 24 hours. *Alternatively, ask the class to be mindful of their usage of resources over the next 24 hours and use the next class period to do the Sustainability Personal Inventory with estimates from their memory of the last day.
Extensions		At the next class, have students bring the completed Sustainability Personal Inventory worksheet to class and do the exercise again, just adding up the amount of resources they used in this 24 hour period. Have them compare the numbers from the first poster to see if usage went down.