Teachers Guide and Classroom Activities

"Students in elementary school should have a variety of experiences that provide initial understandings for various science-related personal and societal challenges. Central ideas related to health, populations, resources, and environments provide the foundations for students' eventual understandings and actions as citizens. Although the emphasis in grades K-4 should be on initial understandings, students can engage in some personal actions in local challenges related to science and technology."

From the National Science Education Standards

The Natural Resource Vampire is a great way to (1) define the concept of natural resources, (2) discuss where the products and services we use everyday originate, (3) introduce consumption and sustainability, and (4) foster connections between these ideas and individual behaviors.

Where to Begin?

Hold up a piece of paper and ask the students where it came from and what it is made of. The paper itself is not a natural resource, but it made from a natural resource- a tree. How did that piece of paper turn from a tree into the product that we use every day? The answer, of course, is that it was *processed* into paper. A tree was harvested (or cut down), the bark was removed and it was cut into small pieces. From there the pieces were turned into pulp by mixing the chips with water and other chemicals and then separated into individual wood fibers. The paper was then shipped to stores where it was purchased and ended up in the classroom.

Terms to Introduce:

Renewable Resources
Non-renewable Resources
Consumption
By-products
Waste Stream
Sustainability

Essential Classroom Questions:

Where do natural resources come from?

Natural resources are naturally occurring substances that are valuable in their relatively unaltered form. Natural resources are divided into 2 main categories: renewable and non-renewable. **Renewable resources** are those that replenish themselves naturally at rate comparable to consumption and include things like fish and fresh water. Even though renewable resources regenerate relatively quickly- as the global population continues to grow, so the demand placed on these resources. This imbalance has the potential to disturb the natural equilibrium we find in many ecosystems since demand outweighs the rate at which the earth can re-make renewable resources. **Non-renewable natural resources** are the resources used by humans that take long amounts of time for the earth to create and include many of the resources we use for energy like gasoline, coal, and natural gas. These things take the earth so long to make that once these resources are depleted they will no longer exist naturally in our lifetime.

Where do the products we use originate and how do they travel to us?
Many products we use everyday are derived from renewable and non-renewable natural resources; the foods we eat, the aluminum soda cans we drink from, even the water from the faucet. Many of these things, like paper, are processed and shipped to stores where we buy them and take them to our homes for **consumption**. Remember that these products don't just appear on the shelves, and sometimes they even travel thousands of miles to get to us. Take, for example, aluminum soda cans. Aluminum cans start as an ore called bauxite usually mined from either Australia or Jamaica. Alumina is extracted from the raw material, smelted, and turned into slabs after a series of processes which omit greenhouse gasses as **by-products** which are the unintended side effects of an operation. From there the aluminum slabs are sent to different factories where the aluminum is flattened and sent away yet again to a place where the aluminum is turned into cans and printed with logos. After all of this traveling and processing, the cans themselves are worth more than the soda that is inside! The cans are finally sent to the bottling plant where they are filled with soda and then ultimately shipped one last time to stores for us to buy.

Remember, every time we recycle- we take several steps out of this long process and therefore are responsible for omitting less greenhouse gasses and saving natural resources by re-using them, and recycling them!

Where do the consumer goods we throw away go after we are finished with them?
Even though we do not encounter waste after it goes into the trashcan, it must go somewhere. We have discussed how certain products and services get to us, but where do they go after we are finished with them? When we put our trash on the curb, someone comes and gets it and it magically disappears. The reality is that it doesn't really just go away; it becomes part of the **waste stream** which is the overall waste production that a community generates and sends away for disposal. Although some of the stuff we throw away can be composted (organic matter that decomposes) or recycled, the fact is that most of it is either burned (incinerated) or placed into dumping grounds called landfills.

We produce so much garbage that we are running out of landfills! Did you know that the average American produces 6 pounds of waste a day? Before the year 2000 there were approximately 15,000 landfills in the United States and now less than 2000 remain.

What can we do to use these resources responsibly?
There are things we can do to use our natural resources responsibly. **Sustainability** means using natural resources at the same rate at which the earth can produce them. This means that we need to think about how our actions affect the earth- and be careful not to waste products that come from natural resources. With renewable natural resources like paper this means that we need to monitor the amount we use and ensure that there are going to be enough trees for the future before we decide to harvest the ones we have. With non-renewable resources like coal this means that we try to look for alternative ways to get the same result like using wind power and solar energy.

We can all make a difference just by being aware of our actions and making sure that we are using products derived from natural resources responsibly. Introducing the concept that

individual actions and behaviors have significant impacts on ecosystem and resource health is a great way to foster foundational concepts to young students meant as a pathway to eventual deeper understandings.

Making Connections

Making connections between behaviors and natural resource use is a great way to empower students to be aware of their actions. Below are a few examples that link behaviors to consequences and create simple causal models that introduce students to the concept of cause and effect.

Natural Resource Vampires Waste Energy

Turning off the lights after you leave a room is one of the simplest ways you can save energy. Remember that the industrial processes that give us electricity also produce the majority of man-made greenhouse gasses in the atmosphere. These gasses are some of the same that account for much of the increased warming found in our atmosphere.

Turning off the light = less greenhouse gasses = less atmospheric warming

Natural Resource Vampires are Downright Wasteful

Trees are not "destroyed" to make paper, they are processed into paper. The problem we are faced with is not that we are wasting trees by turning them into paper, but that we are wasting paper and driving the need to harvest more trees.

Using less paper = more trees = more undisturbed habitat for animals and more oxygen

The plastic used for making water bottles is derived from crude oil. The amount of oil needed to meet the annual American water bottle demand is enough to fuel 100,000 cars for a year.

Less bottled water = less oil processed = less pollution in our air and oceans

Natural Resource Vampires Waste Water

Less than one percent of the world’s water is available for us to use. Rivers, lakes, aquifers, and reservoirs do not have endless supplies of water for us to drink and wash with- but are limited by things like the amount of rain. That means that if we use too much water then there is less to go around for the other plants and animals who rely on it too.

Less water use = More water in rivers, lakes, aquifers = more water for plants, animals, and us

Eco-Violation Activity

The Natural Resource Vampire materials include eco-violations to foster sustainable resource use in the classroom. Eco-violations empower students to be aware of their actions and the actions of others by monitoring how they use products and services derived from natural resources. Laminate the eco-violation “tickets” and distribute them to individuals whose actions “suck” natural resources. Promote the activity of administering tickets as a game or competition in the classroom to allow students to monitor their own behaviors in everyday activities.