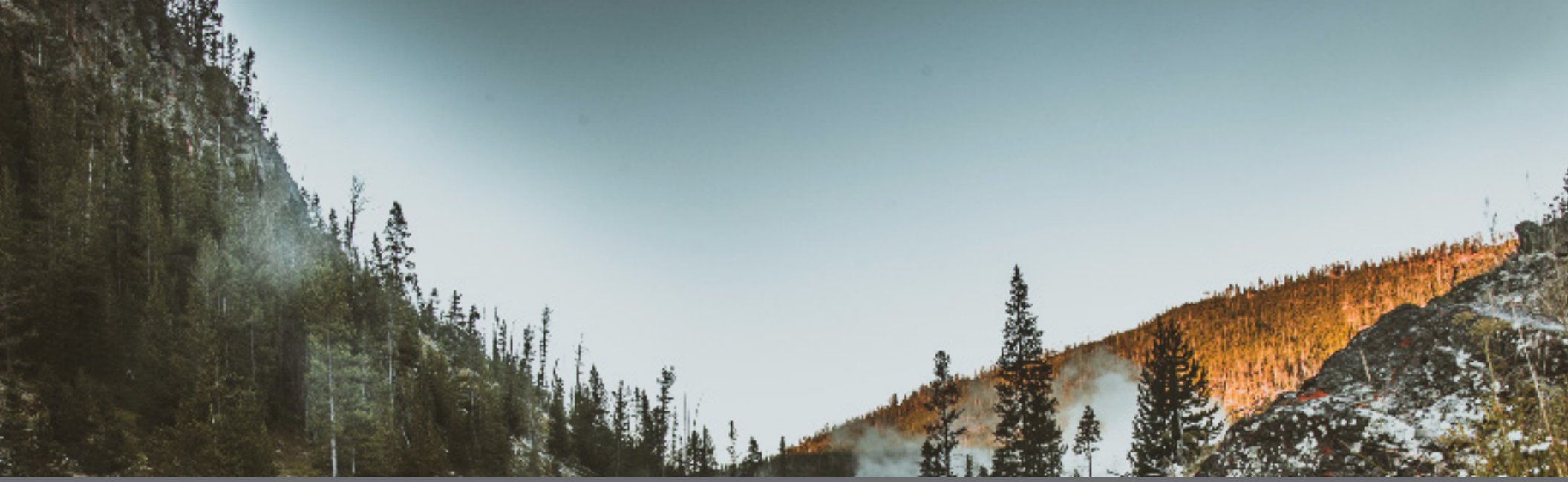
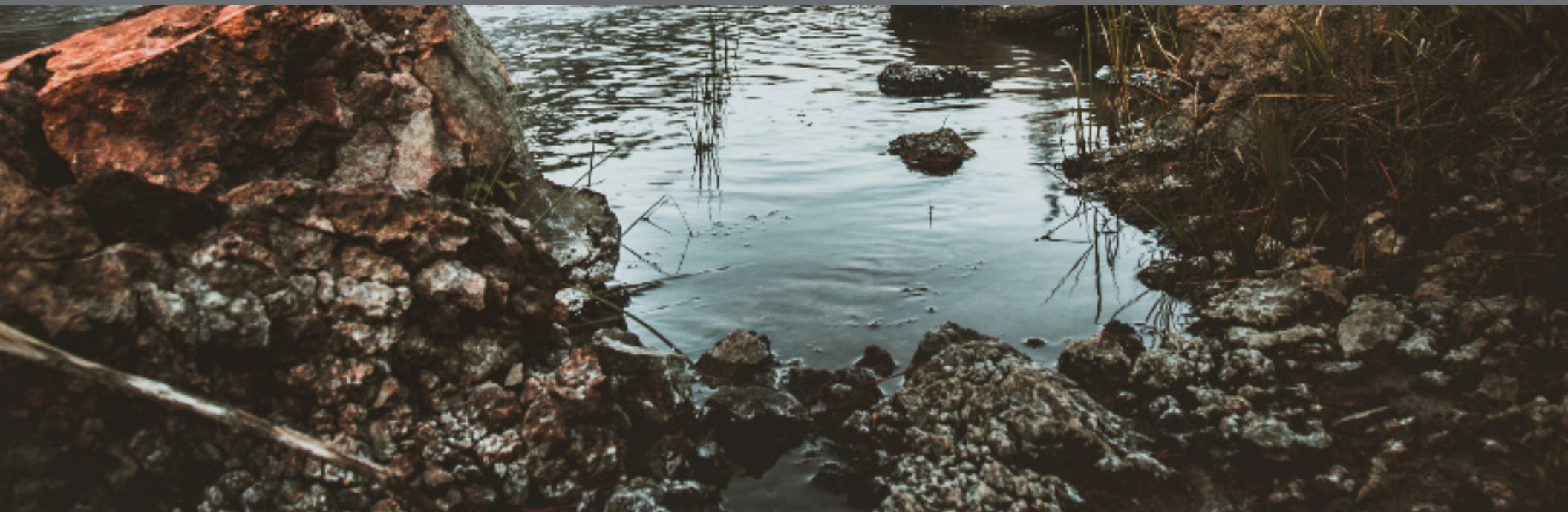
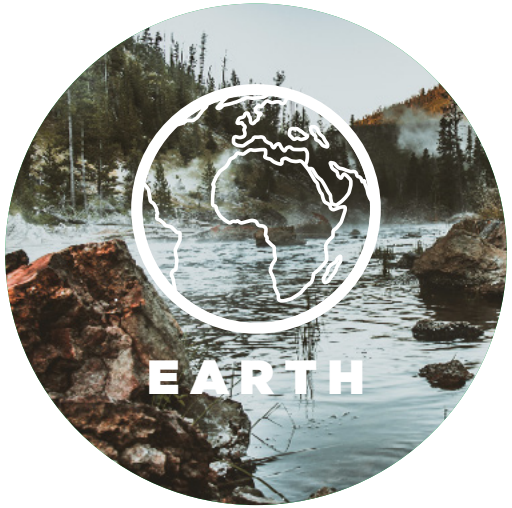


7TH GRADE

STEAM LESSON





BE THE CHANGE

Driving Question:
How does the amount of waste produced locally affect the environment and what are solutions to resolve these affects?

Materials Needed:
Notebook to record observations, writing utensil, camera to record waste and effects of waste (optional), materials such as cardboard to design product, sketch book, items collected from their families "trash" (explained in lesson), glue, wire, tape or other materials for creating a 3D piece from found objects

In this lesson, students will:

- explore the amount of waste, both recyclable and non-recyclable produced by their family and school mates;
- recognize the effect that waste has both locally and globally;
- come up with multiple solutions to either reduce or better manage waste; and
- create a 2D or 3D piece of art from "trash."

TEKS:
Science: 7.8(C); 7.10(A)(B)(C); 7.13(A)
Art MS 2: 1(B)(C)(D); 2(A)(B)(C); 3(B); 4(A)

SPINNING THE COCOON

Prior to beginning this lesson, instruct students to either check their trash cans at home or think about the things they throw away in a day. Make a quick list of items that end up in the trash daily. Ask students if they have recycling bins or other alternate way of disposing of waste. Some students may note that their family throws away a lot of paper plates, others might say their family uses a lot of baby diapers.

At school, begin this lesson by taking your students on a "field trip" around the school to look at waste. Drop by the cafeteria and count the number of trash bins, go outside and look for signs of litter or waste receptacles, and even take a glance in the dumpster. Have students add to the list of items frequently thrown away. Note whether or not your school has a method for recycling and, if so, what items can be recycled. Do a search for the top 10 items found in landfills and the amount of time it will take them to decompose.

Read this page from the National Park Service about plastic straws with your students. Discuss with students the many ways that something as simple as a straw can have a detrimental effect on the environment. Emphasize the human impact on water and the way our input can change how species interact with the environment.

Take another walk around the school to observe species, or brainstorm and discuss species that may be impacted by waste in the immediate area. Students might see or suggest birds, fish, outdoor pets, raccoons, or insects such as honey bees and other pollinators.

Take the waste discussion further by discussing the effects on the environment if our current behavior continues. What might happen to an entire species? What happens if a species or multiple species are lost?

This will act as a segue into discussing species diversity and how waste disrupts food webs. One excellent local example of how a lack of species diversity can lead to catastrophic events is the cotton boll weevil almost eliminating cotton monocultures. Students can use the species list they compiled to create a quick food web and look at how species could be affected by waste. For example, if too many Styrofoam food trays from the cafeteria made it into the local pond, this could block light from getting to the plants, thus reducing the amount of oxygen in the water for the fish and decreasing their population.

THROUGH THE LENS

One of the most important ways to combat excessive waste is to educate people about its impact on the Earth. As students are answering the questions for their research projects, have them also interview their family members, friends or others in the community and ask them the same questions. The students should record the interviews and present them to the class. Once everyone has played their interviews, form a discussion around the following questions:

- How many people were able to answer the question correctly?
- How might we help to educate the community on the impact of waste?
- What are some alternatives that we can introduce to the community to help make eliminating waste easier?

METAMORPHOSIS

Students or student groups should choose one of the items they noted in high concentration in either home or school waste receptacles. Make sure that at least one of the groups chooses to focus on plastic straws. For the first part of the project, students will investigate their item further and report on their findings. Student research for their report should be both online and discovered by exploring their neighborhood, waterways such as ponds and drainage, and, if possible, the local landfill. Be sure to discuss safety before students embark on their research. Some questions the students must respond to in their report include:

- Why do we use this particular item?
- What percentage of the total trash does our particular item take up? (For example, Styrofoam trays compose about 80% of our lunchroom trash.)
- How long does the item take to break down in a landfill?
- How often do we see items made of the same material as litter in our town or neighborhood?
- What species might this item have a detrimental effect on?
- How would it affect those species?
- How does that affect the food web the species is a part of?

Students will use this report as a guide on the second portion of the project. In this portion of the project, students will come up with a resolution for the negative effects. Students should understand why we use this item and then propose other tested solutions for the item. For example, students may test alternatives to the Styrofoam trays such as recycled cardboard. Students may also explore solutions that don't involve waste production such as using stainless steel trays. For each method they come up with, students should also explore the above questions and compare them to the original item. At the conclusion of their research and product testing, students will report their findings and their proposed solution for reducing or eliminating their particular waste item.

UPCYCLE

Design it better! Many companies are looking at alternate ways to build their products. For example, many tons of food-grade plastic wrap could be replaced in the landfill by using new Bee's Wrap, a sustainable food wrap made out of beeswax. Use natural, recycled and/or compostable materials to design your own replacement product for the item you investigated. Test your prototypes and come up with a plan that would allow the best one to be engineered on a scale large enough for it to sustainably serve people with an earth-friendly alternative!

eARTh

Activist art is a type of art that is created to bring awareness to an issue that affects society in some way. Because the environment is a huge concern, many activist artists create pieces that bring awareness and new perspectives to issues plaguing our planet.

Show your students some of the work on this site that deals with environmental issues. There are some amazing examples to pick from. Have an in-depth classroom conversation around three or four of them. Ask the students questions* such as:

- What do you see?
- Do you think this is a successful piece of activist art?
- Why or why not?
- Would you change anything?

**As the students are talking, remind them to use proper vocabulary relating to the elements of art and principles of design.*

Now, instruct students to collect items from their trash at home throughout the week that they can bring to school. They should not bring anything that could spoil or rot, or any container or wrapper that has not been thoroughly rinsed.

After they have had time to collect their trash, they should make a sculpture or 2D work of art with it! Have them lay out all of the items that they were able to bring. They should begin to brainstorm their sculpture or 2D work by creating some sketches of their ideas. Invite them to trade items if they want.

Once they have finished, the students will present their projects to the class. If possible, display the pieces for their peers and teachers to view. Have them write an explanation of the piece, what it is comprised of, and what they learned about consumer waste in the process of creating their art.

Note: Earth Day is celebrated each year on April 22nd. This would be a great project to do for Earth Day to raise awareness of the amount of waste that families can produce in as little as a week.

Community Garden

There are a number of alternatives to using plastic straws. Visit this link with your students and discuss all of the options available for ecofriendly straws. Many of these options are very affordable! Work with your class to think of a way to raise money so that you can purchase some of these options, then, set up a booth at a local Earth Day event, or any community gathering, and hand the straws out to visitors. Be sure to include information regarding the level of harm plastic straws bring to the ecosystem and marine life. EarthX has launched a campaign to Strike Out Straws; at earthxfilm.org students can take the pledge to reduce the burden of single use plastic straws on our environment.

KERNEL OF KNOWLEDGE

According to an article in *The Global Citizen*, the U.S. alone uses over 500 million straws each day.

CAREER CONNECTION

Recycling Sorter - Recycling sorters go through the mixed recycling from community or residential bins. They use a conveyor belt to remove, sort and clean materials. This career requires a high school diploma or GED.

Recycling Coordinator - Recycling coordinators work with cities and other entities to coordinate recycling programs and manage the employees within that program. They are also responsible for community outreach and education programs. This career requires a bachelor's degree in a recycling related field.

Waste Management Driver – Waste management drivers use large trucks to collect trash and recycling from residences and other sources. They usually also perform general maintenance on their truck. This career requires a high school diploma or GED as well as a Class A or Class B driver's license.

Ecologist - Ecologists are scientists that specialize in studying ecosystems and how the organisms in them interact with each other. They may work to correct damage to an ecosystem or research an area to prevent damage from occurring. This career can range from needing an associate's degree for general lab work to requiring a master's degree for more advanced studies in ecosystem management.

Inventor - Inventors create new products and build prototypes. They then apply for patents to secure their invention. This career requires a high school diploma or GED.

CAREER HIGHLIGHT

Jackie Nunez was traveling in the Caribbean when she realized just how detrimental the plastic straws in our drinks have been to the ocean. She has since founded The Last Plastic Straw, a movement dedicated to decreasing our plastic consumption, thus reducing the level of plastic pollution in our water.