Macro/Micro Plastics Lesson Plan – A visit to the beach

Consider starting this lesson plan with an acknowledgement that we are all living and working on what are traditional land and territories of native tribes. Around Lake Tahoe, we are living and working on the traditional lands of the Washoe Tribe. If you want to find out which tribe(s) you should acknowledge in your area you can check it out here. https://native-land.ca/

Overview and Purpose

The purpose of this lesson plan is to let students experience the macro/micro plastic problem firsthand. After the presentation from CUTL about trash in the environment (either remotely or in person), teachers will pick a convenient time to walk down to the beach and let kids get hands on experience with plastics in the sand so that they can see how prevalent the problem is and start to brainstorm what to do about it.

Objectives

Let the students see the macro/micro plastic problem firsthand.

Have them analyze the final data to determine if there is a reason plastic is more prevalent in one area or another.

Get them thinking about what to do about it.

Have them propose solutions for cleanup and prevention.

Time Required:

Half an hour presentation from CUTL then….

2 Hours to collect samples, do initial filtering and counting.

If you wish to leave materials drying to soaking (see procedure) over night, you will have to plan accordingly.

Materials Needed

Tape Measure

Small landscaping flags mark the corner of the study areas.

Small trowel or large spoons or scoops for the students to dig sand with.

Container to hold the sand and return it to the classroom.

Fine Sieve, like a window screen.

Tarp to capture sediment that moves through the sieve.

Tweezers to help students grab small pieces of plastic.

3-4 Large Cups (preferably clear)

Paper plates for drying/counting material.

Filtered water.

Procedure:

1. At the field site, randomly select a 3ftx3ft square over the wrack line or over other heavily used areas of the beach. (Depending on the size of the class you can split the students into groups and analyze multiple areas on the beach.)

2. Use the trowel/spoon/scoop to scrape about the top two inches of sediment/wrack and scoop it into a container or bag. Seal the container.

3. If the sediment is wet, take it back to the classroom, pour the contents of the container onto paper plates and spread out the sediment to dry. Leave at least overnight. If the sediment is already dry, you can skip this step.

4. Sift the sediment through the sieve. Capture the fine sand that comes through the sieve and save it to return it to the field location.

5. Visually look through the sediment and debris left in the sieve (you can pour it back onto a clean paper plate to help with this step.) Look for any obvious pieces of plastic and pick them out. Set them aside in a small container.

6. Take the remaining sediment/debris in the sieve and pour it into one or more large cups. Fill the cups about ¾ full of filtered water. Stir well. If you see plastic pieces rise to the surface, go ahead and pick them out and add them to the ones previously found.

7. If there is plant material in the debris, it will also float (as will pieces of crab shell and small snail shells that have air trapped in them). The longer the plant material soaks, the more likely it will be to sink. If possible, leave the cups overnight and stir and check them again the next day before discarding the contents.,

8. Have the students divide up the plates and start counting the plastic pieces. Measure a few samples and see if you can estimate their average size.

9. Once you have done the analysis, finish with a brainstorming session on:

    - How can these plastics be removed from the soil on a large scale? Is it an engineering problem? A chemistry problem? What are the ideas?
    - How can we stop plastic from getting into the soil in the first place? Plastic alternatives? Reusable instead of single use? Demand change from plastic producers?
    - Do the students have solutions they could propose to local leadership? If so, start writing letters presenting the findings of this science experiment, or start a petition to ban single use plastic or….
    - WHAT CAN YOU DO?

Verification:

- Can students tell you about the dangers of plastic permeating our environment?
- Are students aware of the prevalence of plastic in the environment?
- Are they thinking about solutions and things they can do to reduce their plastic use?

*Adapted from The Florida Sea Grant Extension and Education Program