



# Boston Harbor: A Living Laboratory

**Grade:** Grade 5/6

**Place of Focus:** Boston Harbor

## Massachusetts Curriculum Framework for Science and Technology/Engineering Standards

- **5-ESS3-1.** Obtain and combine information about ways communities reduce impact on the Earth's resources and environment by changing an agricultural, industrial, or community practice or process.
- **4-PS4-1.** Develop a model of a simple mechanical wave (including sound) to communicate that waves (a) are regular patterns of motion along which energy travels and (b) can cause objects to move.
- **4-ESS2-1.** Make observations and collect data to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering and moved around through erosion.
- **3-ESS3-1.** Evaluate the merit of a design solution that reduces the damage caused by weather.

## Lesson Overview

This lesson will introduce students to the ideas of field science, participatory science, and how the Stone Living Lab is using this kind of science to answer urgent questions about climate change in Boston. Students will learn that science can be done anywhere, by anyone, and that there are many tools to help us do science in our communities. Students will begin to explore the ways scientists can answer questions about climate change in Boston.

This is the first of four lessons centered on the work of the Stone Living Lab: climate change, Boston Harbor, and participatory science.

The goal of this first lesson is to familiarize students with the Stone Living Lab and introduce the concept of participatory science, breaking down the preconceived notion that scientists are exclusively white, male, and work in labs.

## Essential Question

How do we know something is changing?

## Learning Objectives

*By the end of the lesson, participants will be able to:*

- Explain the term "living laboratory" and begin asking scientific questions
- Explain the mission and research focus of the Stone Living Lab
- Generate ideas on how to measure change in an environment
- Engage auditory senses to start asking questions in a scientific way

## Lesson Preparations

### Time

1 hour, in classroom

### Materials and Supplies

- Google Slideshow (included)
- Drawing paper
- Colored pencils, markers, etc. (drawing materials)
- Projector and screen

## Lesson Activity: Slideshow Presentation

### What do you think about when you hear the word "Laboratory?" (15 min)

- Ask students to draw what they picture when they hear the word "laboratory"
- In pairs or small groups, have students share what they created
- Ask students to share with the class and record themes or similarities. What do you notice?

### Introduce the Essential Question: *How do we know something is changing?*

- Brainstorm with students how they notice or observe change in the natural environment in their own lives
- Tell students we will be revisiting this question in each lesson of the series

### All of these people are scientists. What do you notice about where they are working? (15 min)

- While presenting the included Powerpoint, highlight pictures of scientists conducting research at various outdoor sites (*Slide 2*)
- Ask students, "Are there any differences or similarities between what you drew and what you see here?"
- "What do you notice about where these scientists are working?"
- Emphasize to students that all of these places pictured are laboratories!
- Define a laboratory as a place where you can ask questions, create theories, and test them out (*Slide 3*)
- Ask students to name some examples of natural settings that can act as laboratories, such as beaches, marshes, islands, or living shoreline
- Ask students, "Are there any differences or similarities between the laboratory you drew and the laboratories you see here?"

### How do we answer questions about the natural environment? (20 min)

- Show map of Boston Harbor (*Slide 4*)
  - Ask students, "Do you recognize this area? What is this map showing?"
  - Point out where you are currently located with a star
  - Tell students, "The Stone Living Lab asks questions about changes on the coast, climate change, and how we can work with nature to adapt."

## Lesson Activity (cont.)

- Prompt a student brainstorm: “What do we know about ‘climate’ and ‘climate change?’” and record student answers.
- Explain to students that we will be learning more and defining climate change later in the lesson series

### **Some of the places that Lab scientists study are beaches. We want to know: Do beaches change day to day and season to season? How will climate change affect beaches? (15 min)**

- Show image of Constitution Beach in Boston
  - Ask students: “Does this place look familiar? Have you been to Constitution Beach?”
- Watch a calm beach video, followed by a stormy beach video
  - Ask students: “What do you notice or observe? Do you think this beach changes? What kinds of things can we measure?”

### **Generate Curiosity**

- Explain to students that we can observe with all of our senses. Now we'll observe by listening
- Visit YouTube for soundscape: "[Carson Beach; Boston, Massachusetts](#)"
- Do the “Fist of sounds” activity
  - Ask students to make a fist
  - Listen to this soundscape and lift a finger as soon as you hear a new sound
  - Ask students: “How many specific sounds can you hear?”

## Conclusion and Reflection

- Ask students if they can think of how any of the sounds they hear relate to factors that might cause change on the beach. For example, wind, water, air traffic (can contribute to air pollution), etc.
- Explain to students that there are many factors that cause change at the beach. Ask, “How can we measure just one to answer a scientific question?” Explain that next lesson we will define a “model” and use a model beach to measure change caused by waves.