



## **Discovering Rain Gardens: Controlling Erosion Naturally**

*Focusing on the Howe Garden (80 minutes) – Grades 2-4*

### **About**

This lesson is about how weathering, erosion, and deposition shape our world. Students will take part in two different experiments that show these processes. Then, students will learn how we can work to stop and control erosion. During these experiments, students will be taking observations and writing/drawing pictures of what they are seeing. Students will also be looking at different landmarks and how wind and water weathering and erosion have changed and shaped them over time. Students will also learn how we are working to control and prevent erosion here at Cheekwood through our rain garden. Then, after their visit, students will return to their classroom and brainstorm ways that weathering and erosion can be prevented at their school, at Cheekwood, or even in their community.

### **Objectives**

1. Students will understand what weathering, erosion, and deposition are and how it happens through demonstrations and experiments.
2. Students will learn about the most effective ways to prevent erosion.
3. Students will brainstorm other ways that erosion can be prevented here at Cheekwood and throughout the world.

### **About the Howe Garden**

In 1922 Harry and Cora Howe purchased an 8-acre plot of land in East Nashville, at which time Mrs. Howe began creating her locally and nationally acclaimed garden, named the Wildings. Mrs. Howe planted over 250 native species of native plants, wildflowers, tree, and shrubs. In 1929 (the same year that Mr. and Mrs. Cheek broke ground on Cheekwood), Mrs. Howe opened the Wildings to the public, making her garden what most consider to be the first public garden in Nashville.

In 1933 the Wildings was all but destroyed by a historic tornado, which ravaged approximately 100 trees, and devastated the rest of the garden. With the encouragement of the Garden Club of Nashville, of which Mrs. Howe was a founding member, the garden was rebuilt and was better than before. Sadly, Mr. Howe passed away in 1966, and Mrs. Howe followed in 1967. The estate heirs were unable to maintain the garden, and with the help of the Garden Club of Nashville, the Wildings plants, shrubs, bushes, tool shed, garden gates, stone walls, and other components were donated to Cheekwood.

In 1969 the Howe garden was opened at Cheekwood, which made it the first public installation. In 2011 the Garden Club of Nashville raised one million dollars for a renovation of the Howe gardens, which included rethatching the tool shed (which Mrs. Howe had imported from England), installation of the rain garden, new bridges, and new paths. In December of 2018, the Garden Club of Nashville celebrated the 50<sup>th</sup> anniversary of the Howe Garden by planting 50 native azalea plants.

### **Vocab**

Erosion - wearing away of the earth's surface by wind or water.

Weathering - to change because of being exposed to the weather.

Deposition - the act of depositing something, or the thing deposited.

Sediments - solid material that settles to the bottom of a liquid.

Rain garden - A rain garden is a garden of native shrubs, perennials, and flowers planted in a small depression, which is generally formed on a natural slope. It is designed to temporarily hold and soak in rain water runoff that flows from roofs, driveways, patios or lawns. Rain gardens are effective in removing up to 90% of nutrients and chemicals and up to 80% of sediments from the rainwater runoff. Compared to a conventional lawn, rain gardens allow for 30% more water to soak into the ground.

A rain garden is not a water garden. Nor is it a pond or a wetland. Conversely, a rain garden is dry most of the time. It typically holds water only during and following a rainfall event. Because rain gardens will drain within 12-48 hours, they prevent the breeding of mosquitoes.

Native plants - A plant occurring naturally in an area and not introduced by man; indigenous

Perennials - plants that grow for many growing seasons. Most of the time, the top portion of the plant dies back each winter and regrows the following spring from the same root system. Many perennial plants do keep their leaves the whole year and make attractive borders and groundcover.

Habitat - the natural environment of an animal or plant.

Filtration system - used to process, separate, or clarify a stream by separating elements and removing debris. The goal of a filtration system is to cause the air or fluid being processed to be as pure as possible.

Pollutants - A pollutant is a substance that is present in concentrations that may harm organisms (humans, plants and animals) or exceed an environmental quality standard. The term is frequently used synonymously with contaminant.

Docent - a person who leads guided tours especially through a museum or art gallery

**Landmark** – a usually large object on land that is easy to see and can help a person find the way to a place near it; an important building or monument; an event that marks a turning point

### **Standards Covered**

2.ESS2 1) Compare the effectiveness of multiple solutions designed to slow or prevent wind or water from changing the shape of the land.

2.ESS2 2) Observe and analyze how blowing wind and flowing water can move Earth materials (soil, rocks) from one place to another, changing the shape of a landform and affecting the habitats of living things.

2.LS2: Ecosystems: Interactions, Energy, and Dynamics

1) Develop and use models to compare how animals depend on their surroundings and other living things to meet their needs in the places they live.

2) Predict what happens to animals when the environment changes (temperature, cutting down trees, wildfires, pollution, salinity, drought, land preservation).

3.ESS2: Earth's Systems

1) Explain the cycle of water on Earth.

2) Associate major cloud types (cumulus, cumulonimbus, cirrus, stratus, nimbostratus) with weather conditions.

3) Use tables, graphs, and tools to describe precipitation, temperature, and wind (direction and speed) to determine local weather and climate.

4) Incorporate weather data to describe major climates (polar, temperate, tropical) in different regions of the world.

4.ESS1 1) Generate and support a claim with evidence that over long periods of time, erosion (weathering and transportation) and deposition have changed landscapes and created new landforms.

**Pre-visit information:** For the pre-visit, there will be a virtual meeting that will happen between a Cheekwood staff member and the class. There will be a PowerPoint that is shared about Cheekwood's history, and a brief introduction on what student's will be learning during their Cheekwood visit. Specifically, there will be information on Cheekwood's rain garden in the Howe Garden, and native plants in the Howe Garden and throughout Cheekwood. There will be key vocabulary words introduced and discussed during this virtual visit as well.

### **Overview of the Day**

1. Students will start off at the First Learning Center where they will have just gotten off their bus. As soon as students are off the buses, a movement activity will be lead. Then, there will be a quick overview of the guidelines we ask students to follow while they are here.

2. Teachers will already have students preassigned to 3 different groups. After the movement activity, students will separate off into those assigned groups.
3. One docent will be placed with each group. This docent will be with that group the entire time. (Groups will be ~15 students each)
4. Docents will already be preassigned to different starting points for the field trip. The docents will be assigned to one of the starting points listed below. (Each activity will be 20 minutes with 3 minutes for transitions between stations):
  - a. Erosion experiment #1 (20 minutes)
    - i. At this experiment, there will be three 2-liter bottles with different substances in them. One with just soil, one with soil and mulch, and one with grass/plants growing. There will be a ½ of a water bottle at the bottom spout of each 2-liter to catch the water that isn't absorbed. Water will be poured into the 2-liter bottle, and what is caught in the water bottles below will be compared to one another. Students then will compare what held onto soil the best and helped prevent erosion. Students will then brainstorm why they think this method worked the best to stop the erosion, and how they think this works in their everyday life. Thoughts and observations will be recorded on provided worksheets through words and pictures from students.
  - b. Weathering and erosion experiment #2 (20 minutes)
    - i. At this experiment, there will be sand in a cookie sheet with sand piled to the side in a sloped hill formation with a river running down the hill. Water will be poured in the river, and students will watch as the sand is carried with the water. Next, a straw will be taken and blown at the sand and students will observe as the sand moves and flies away. This is creating wind weathering and erosion Thoughts and observations will be recorded on provided worksheets through words and pictures from students.
  - c. Weathering & Erosion: Before and After (20 minutes)
    - i. At this station, students will have a venn-diagram they use to compare an area before and after weathering and erosion have taken place. Then, students will learn about what a rain garden is, and how we have one here at Cheekwood to prevent water erosion. During this conversation, students will also learn about native plants and how they are used and why in rain gardens.

**Post Visit:** Using what students have learned about erosion, they will start to brainstorm how erosion can be prevented at their school, at Cheekwood, or even in their community. Students will draw what the area they want to stop erosion in looks like now, and what it will look like after they implement their ideas to stop erosion. Then, they will write a brief paragraph explaining what their erosion stopping idea is and how it will work.

**Post Visit Book Suggestions:**

*How Do Wind and Water Change Earth? (Earth's Processes Close-Up)*, By: Natalie Hyde  
*Weathering and Erosion (Science Readers: Content and Literacy)*, By: Torrey Maloof