

LESSON PLAN 1: INTRODUCTION TO GLACIERS: DRIFT VS. DRIFTLESS

Overview:

During the past 2.5 million years, numerous continental glaciers advanced and retreated across much of the upper Midwest, with the last melting some 12,000 years ago. Four major periods of glacial activity shaped and deposited both the topography and soil types that we see today across much of the Midwest.

However, areas of Illinois, Wisconsin, Iowa and Minnesota along the Mississippi River somehow escaped the scouring and depositional effects of glaciation. Scientists believe that glacial lobes of ice during different periods came from different directions, completely surrounding yet somehow missing this area. Because the area wasn't covered with glacial drift (sand/gravel) it was named "The Driftless Area". Saved from the impacts of glaciation, The Driftless Area gives scientists a rare look at pre-glacial geology that also harbors rare species that are true Ice Age relics.

Duration: 30-45 minutes

Grade Levels: 5-8

Subject Areas: Earth Science, Physical Science, Geography

Standards Addressed: 4-PS3-1
PS3.1
4-PS3-4
5-ESS3-1
MS-ESS2-5
MS-ESS2-3
MS-ESS1-C
MS-PS2-4

Objectives:

- Students should learn the process of glacier formation over a very long time period.
- Students should learn how glaciers move and the resulting land formations.
- Students should learn glacial features found in the Midwest.
- Students should learn the difference between glacial drift and driftless areas and the resulting land features of each.
- Students should learn factors that influenced the glacial movement.
- Students should learn the implications of no glacial activity on the land, as well as which plants and animals are likely to thrive in that area.

Teacher Background:

A glacier is made up of thick layers of compressed ice formed from repeated snowfalls that has the ability to move. It flows like a slow river of putty and physically changes the shape of the land in the process. The size of a glacier can vary from as small as a football field to hundreds of kilometers. A glacier forms when the amount of accumulating snow is greater than the amount that melts. This accumulation remains year-round and compresses the lower layers into ice. The extreme weight of the glacier deforms the lower layers of ice similar to putty. This characteristic, along with the pull of gravity, causes the ice to move through mountain valleys or across plains. It can change speed and at times retreat, altering the land beneath by a combination of forces.

As a glacier moves, it carves away land by erosion and also deposits and sculpts new landforms. Sculpting and deposition can form moraines, kettles, drumlins, and eskers. These depositional features are formed with glacial drift that is made up of sand, gravel, rocks, and boulders created and transported by the forces of the moving ice.

This portion of Northwest Illinois that was not covered by glaciers and the resulting glacial drift is called “The Driftless Area.” The preserved land features in this area include deeply-cut, v-shaped river valleys and rugged bluffs that were not affected by glaciers. The Driftless Area is surrounded by land that was glaciated at different times in history. Scientists have discovered that the Driftless Area was formed in stages by glaciers advancing from different directions during four different periods ranging from 2.2 million to 12,000 years ago. The Driftless Area is rich with historic and geologic information free from glacial impact.

Vocabulary:

Glaciers: a slowly moving mass of ice formed by the accumulation and compaction of snow

Glacial drift: material (sand, gravel, rocks, boulders) created by, transported, and left over after a glacier melts

Driftless Area: area without glacial drift deposits that reveals pre-glacial landscapes such as deep cut river valleys and sharp edged bluffs

Activity: The Glacial Path

Supplies Needed:

Tray

Sand

Index Cards

Blank Paper Map of the Driftless states

Crayons or Markers

Reference Maps of the Driftless Region (for teacher)

Computer with internet

Activity Steps:

1. Using the teacher's image as a guide, have each student shade in areas on the map where glacial ice covered the land. The remaining area is considered "The Driftless."
2. Go to Google Maps. Find your home on the map and see where it would lie within your Driftless map. How close were the glaciers to your town?
3. Using Google images, look up pictures of examples of glacial drift and glacial carving. This is what happened to the landscape elsewhere when glaciers passed through.
4. Now, see if you can find photos of the Driftless area. How is it different from the other images you looked at?
5. Set up a shallow pan or tray and pour sand in the bottom of the tray. Take turns moving the sand at first with their finger, then with a flat index card.
6. Describe the results:
 - What kind of path is made?
 - What happens to the sand in front?
 - What happens to the sand alongside the finger? The card?
 - Dampen sand slightly and repeat activity.
7. See if you can replicate what happened in the Driftless with the sand.

Discussion Questions:

- What are some different ways in which glaciers can affect the landscape?
- What does the landscape look like after glaciers come through?
- How can geologists tell glaciers passed this area by do you think?