Succession on Mount St. Helens

A Carolina Essentials™ Activity

Student Worksheet

Overview

On May 18, 1980, Mount St. Helens (a volcano in Washington state) erupted. The energy of the blast equaled 24 megatons of TNT, and it destroyed everything on the mountain within 8 miles. The eruption column rose 80,000 feet in less than 15 minutes and consisted of molten, high-pressure gas and steam mixed with rock.

Geologists classified the erupted material as **pumice**, lightweight and porous volcanic rock, and **tephra**, rock fragments sized from ash (2 mm) to bombs (64 mm). The eruption cloud spread across the United States in 3 days and circled the planet in 15 days! The energy from the eruption melted most of the snow and glaciers at the top of the mountain, which resulted in sever **lahars** (volcanic mudflows). One of the lahars was reported to be 12 feet deep.

MATERIALS

Graph paper

Colored pencils

Data tables

Between the eruption and resulting lahars, the surface of Mount Saint Helens was scoured, top soil was removed in blast areas, and a large proportion of living organisms was killed. For scientists, Mount St. Helens became a once-in-a-lifetime opportunity to study succession. How is succession accomplished, by what species, and over what time period?

Using a small portion of data generated by the biologist Roger del Moral from the University of Washington, Seattle, you will analyze the eruption and biotic changes on Mount St. Helens since the 1980 eruption.

Photographs courtesy of the USGS.

Mount St. Helen before 1980

Mount St. Helen after 1980

Watch the video of the Mount St. Helens eruption. What do you need to know or study to understand the impact of the environmental changes on the mountain?

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Essential Question

How are scientific data used to evaluate the impact of environmental changes on the number and types of species, including humans, in a given location?

Activity Objectives

1. Use geologic data to identify the topographic changes to Mount St. Helens after the 1980 eruption.
2. Use data of species abundance to classify and evaluate the stages of succession on Mount St. Helens.
3. Identify the immediate and long term impacts the Mount St. Helens eruption had on the local human population, the population of the United States, and the world population.

Activity Procedures

A. Mount St. Saint Helens Eruption Data Table

Plot Name	Aspect	Impact and Deposition Type	Succession Type
Abraham Plain 10	E	Blast; Scour; Pumice	
Butte Camp D 01	S	Tephra	
Butte Camp A 04	W	Tephra	
Butte Camp C 01	W	Scour-mild	
Lahar 04	SW	Lahar-thick deposit	
Pine Creek A 04	E	Scour-moderate; thin deposit pumice	
Pine Creek B 02	ESE	Scour-intense; moderate deposit pumice	
Pine Creek E 03	ENE	Weak blast; tephra	
Pumice Plain 06	NW	Blast; pumice	
Studebaker Ridge 08	N	Blast	
Studebaker Ridge 13	NNE	Blast	
Toutle Ridge 01	WNW	Blast edge	
Toutle Ridge 04	NNW	Blast edge	
Toutle Ridge 06	NW	Blast edge	
Toutle Ridge 10	N	Blast edge	

Data extracted from original tables at Ecological Archives E091-152-D1.

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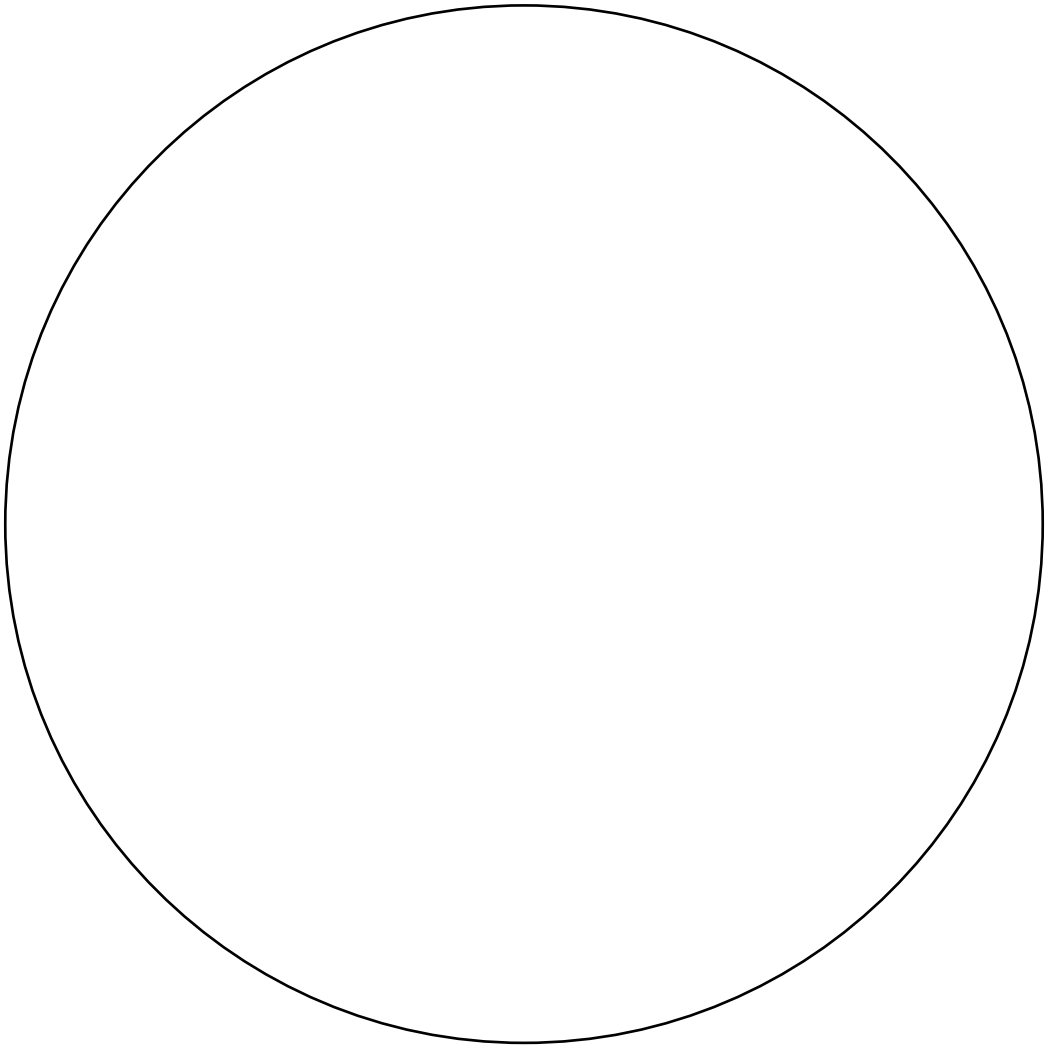
Activity Procedures continued

Eruption Analysis Procedures

1. On the circle below, draw each of the ordinal directions (N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW). There is an angle of 22.5° between each direction.
2. Using a single colored pencil, design a key for the different types of impact found in the Eruption Data Table.
3. Using a second colored pencil, design a key for the different types of deposition found in the Eruption Data Table.
4. Using the Mount St. Helens eruption data, construct a map using aspect, impact type, and deposition type.



Topographical Impact Key

Impact Type			Deposition Type		
Blast	Weak Blast	Scour	Pumice	Tephra	Lahar

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Activity Procedures continued

B. Mount Saint Helens Succession Data

1. Obtain a succession study plot data table from your teacher. Record your assigned plot.
2. On the same set of axes, plot the average percent cover by plants for all 6 species. Use a different color for each species.

Analysis and Discussion

A. Eruption Data

1. Using your eruption analysis, summarize the impact the eruption had on the topography of the mountain?

2. Using the diagram and data table, predict the type or stage of succession (primary, secondary, or disturbance) each plot was in directly after the eruption. Place your answer on the Eruption Data Table.

B. Succession Data

1. Use the graph of average number of species over time to describe the process of succession for your assigned plot.

2. Based on your graph, identify what type or stage of succession your assigned plot is in. What evidence supports your claim?

3. Examine the class succession graphs. Are all the plots on Mount St. Helens the same successional type or stage? What evidence supports your answer?

C. Generalizations

1. Did the eruption data and succession data lead to the same conclusion for type or stage of succession? Use evidence to support your claim.

2. Using evidence to support your claim, argue how the eruption of Mount St. Helens affected human populations locally, within the continental United States, and globally. Identify if the effects were immediate or long term.

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