Unit 4 overview

Learning objectives

In this unit, students will

- define VEI and give examples of hazards associated with eruptions of different VEIs;
- calculate the recurrence interval of eruptions for a particular volcano; and
- explain the relationship between volcanic eruptions and climate.

Volcanic hazards, like earthquakes, have the potential to impact large numbers of people. Volcanoes differ in that we often have warning of an impending eruption and the area impacted by ashfall and climate change is much greater than the area impacted by an earthquake.

In this activity, students will investigate volcanic hazards and their risk to society.

Activity 4.1 – The tragedy of Mont Pelée (Engage)

This portion of the activity is designed to help students understand the learning task and make connections to past and present learning experiences. The tragedy of Mont Pelée lays a foundation to understand why people live in the shadow of volcanoes and the risk of doing so. Students discuss their thoughts, ideas, and questions about volcanic hazards. They should think about how volcanic hazards can become disasters, and they should think about how to reduce the risk of disaster. During the classroom discussion, record all students' ideas on an overhead or a large sheet of paper. Encourage them to consider many different factors. Save the list of questions and ideas for later exploration.

Activity 4.2 – Deadly volcanoes (Explore)

The goal of this portion of the activity is to familiarize your students with the data sets and to pique their curiosity. They study historical volcanoes and are introduced to the volcanic explosivity index (VEI), the scale that ranks the size or impact of volcanic eruptions. They also examine the recurrence interval of eruptions, using Mt. St. Helens as a poignant example. Finally, they become familiar with the types and areal coverage of volcanic hazards; students study the probable ranges of extent for potential eruptions of Mt. Rainier (in Washington, USA) and Mt. Pinatubo (in the Philippines) to see how the number of people might be affected should either of these volcanoes erupt.

There are numerous multimedia files to explore in this section. These files include animated movies and photos from disaster scenes; they are linked to ArcView, so students can explore them within the framework of the GIS.

Students who complete this portion of the activity early should be encouraged to explore some of the questions raised in the Engage section of the activity.

Activity 4.3 – Volcanic hazards (Explain)

In this stage, students are introduced more formally to the science concepts of the lesson. This section covers in depth the various dangers posed by volcanic eruptions, including eruption clouds, volcanic gases, lava flows, pyroclastic flows, landslides, and lahars. Additionally, they learn that volcanoes actually provide important resources, such as build-

ing materials and fertile soil. Finally, they revisit the concept of VEI to see the differences between eruptions with different VEI magnitudes. Discuss these concepts with your students to ensure they have a firm understanding before continuing with the activity.

Activity 4.4 – Volcanoes and climate (Elaborate)

In the Elaborate stage, students apply what they have learned to a new situation. They study the effects volcanic eruptions have had on large-scale climate patterns by relating major eruptions to northern hemisphere climate change through tree ring data. They conclude the lesson with an examination of several major historical eruptions, including the three major Yellowstone Caldera eruptions over the past 2 million years.

Evaluating student comprehension

This section is used to provide students with feedback on their understanding of the lesson. Example assessments are provided, but you may wish to develop other, more authentic assessments that are better aligned with your students' interests. Students might develop a concept map that demonstrates their understanding of the types of volcanic hazards and how volcanoes affect society. Another approach for assessment is to have your students resolve any unanswered questions from the Engage section of the activity.