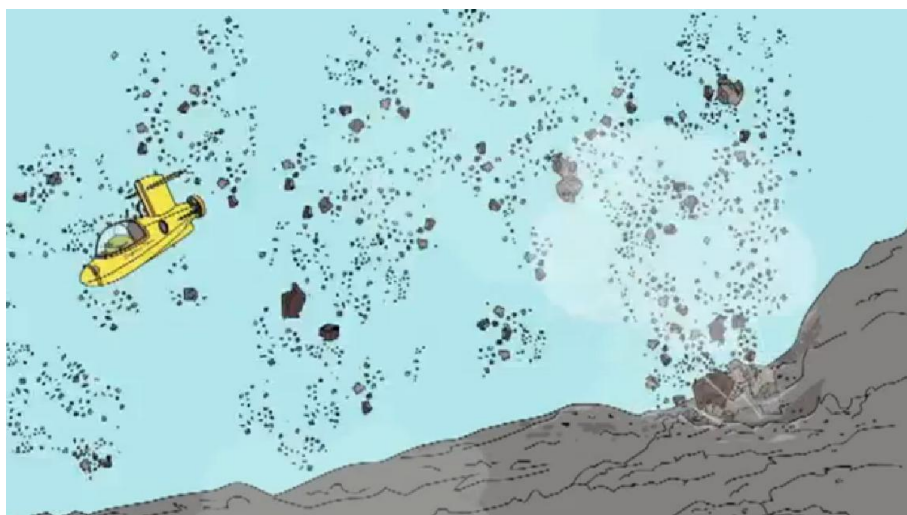


Notes for teachers

At a glance

In this fast-moving and dramatic activity, student groups become teams of volcanologists. They receive a budget with which to purchase and maintain monitoring instruments and satellite data for an active volcano. They decide which instruments to buy, and where to place them. As events unfold they must make quick decisions to respond to changing situations.



Learning Outcomes

- Students explain how instruments are used to monitor volcanoes.
- Students make decisions in role to set up a volcano observatory and choose monitoring instruments within a given budget.

Each group of students will need

- One copy of each of the following task sheets: phase 1, phase 2, phase 3, phase 4;
- One copy of briefing sheet [1];
- One copy of briefing sheet [2] and a pair of scissors **or** laminated cards cut from this sheet, as well as a laminated card made from the section on staffing and maintenance;
- One copy of the map, laminated;
- One copy of the record sheet, for students to write on;
- Blu Tack;
- Whiteboard pen or similar with which to annotate laminated map;
- One six-sided dice.

Possible Lesson Activities

1 Starter activity

- Show the animation 'Underwater volcano disaster' to the class. Remind students that scientists detect moving magma inside volcanoes, as well as escaping gases. These changes help scientists predict eruptions. Oxford scientists, in collaboration with colleagues elsewhere in the UK and around the world, are improving monitoring techniques and methods of data interpretation so as to better predict eruptions.

2 Main activity

- Divide students into small groups. Tell them that a volcano that last erupted in the 1970s is showing some unusual signs – is an eruption imminent? Each group will take the role of a team of volcanologists. Within a budget, they will choose instruments and/or satellite data to monitor the activity of the volcano. Will their decisions provide the data needed to correctly predict an eruption?
- Give each group one copy of each of **briefing sheets 1 and 2**, and allow time for students to look through the information on both sheets.
- If you wish, display the PowerPoint slides. These give examples of data obtained as a result of the monitoring techniques outlined on briefing sheet 1.
- Give each group one copy of the laminate **map** as well as Blu-tac and a whiteboard pen. Point out the volcano – La Soufriere – and the circles drawn at different distances from its summit.
- Give each group the **task sheet: phase 1**. Groups then have 10 minutes to complete the tasks on the sheet. This includes choosing monitoring techniques from the **briefing sheet 1 cards**, fixing the cards around the map with Blu-tac, and drawing lines to show where they have decided to place their instruments (of course they do not need to include satellite locations). Emphasise that all costs – for instruments, for helicopter maintenance trips, and for staff to maintain the instruments and interpret data – must be paid for out of their £50,000 budget.
- If you wish, play a sound recording of a small eruption. Find this by searching for *volcano sound effects* or similar and play it quietly.
- Give each group the **task sheet: phase 2**, and a six-sided dice. Following the instructions in *stage A*, groups throw the dice to work out which of their instruments survived the small eruption.

Next, they use *stage B* to discover the size of their extra budget for the next year. Point out that this stage shows that a network of seismometers is vital in monitoring volcanic activity.

They complete phase 2 by tackling *stage C*. This involves choosing extra monitoring techniques and fixing the cards around the map with Blu-tac, and drawing lines to show where they have decided to place their instruments (of course they do not need to include satellite locations). Emphasise that all costs – for buying new instruments or data, and staffing and maintenance – must be paid for out of their additional budget.

Give students a limited time for *stage C* to get across the idea that volcanologists sometimes need to make rapid decisions.

- Give each group the **task sheet: phase 3**, and a six-sided dice. In *Stage A* students work out how much money they would need to reinstate their monitoring system following a hurricane. In *Stage B* they decide which instruments to reinstate. In *Stage C* they decide how to spend emergency aid money.
- If you wish, play a sound recording of a major eruption. Find this by searching for *volcano sound effects* or similar.
- Give each group the **task sheet: phase 4**. Students use this sheet to work out the effectiveness of their monitoring system. They calculate the value of their undamaged instruments, and add this to any money saved as a result of correctly predicting the eruption. The group with the highest total wins the game.

3 Plenary

Lead a discussion to draw out learning from the role play. Possible questions include:

- What monitoring strategy would you recommend if you were starting again?
- How would your monitoring strategy change if your budget was unlimited?
- What do you think of the current monitoring system on the island? How does this compare with the system your group developed? (The location of actual instruments is given below and also as a single PowerPoint slide. Dry tilt stations consist of tiltmeters, which show changes in the slope of the ground.)

