

Lesson 3: Terraces

Objective

Students will understand how terraces are built to absorb water and prevent erosion.

Inquiry question

Why did the Incas build terraces?

Note to the teacher: If you do not have sufficient time or materials to have students build a model terrace, refer to the Shortcut Activity that describes a simpler terrace-building activity. If you choose the shorter activity, do not refer to terraces as a method of retaining water until the students have completed the activity. Then have the class discuss the questions listed under Procedures, 2 through 6.

Activity: Build a Terrace

Materials

Small stones, gravel, sand, soil, Duplos or other large plastic building blocks, large poster boards with a plasticized surface (one per group), measuring cups, plastic drinking straws, large plastic tubs to collect water.

Procedures

1. *Introduction:* Ask students to recall the terraces they saw in the model and photographs at the exhibition. How were they made? Ask a volunteer to sketch them on the board.
2. Have students get information from the Internet on the average monthly rainfall in their region. Have them plot average monthly rainfall in their region on Handout 2, Table 1, "Monthly Rainfall and Spring Flow." (Note: Students may have to convert inches of rainfall to millimeters.) How does rainfall in Machu Picchu compare to rainfall in your area? Encourage students to understand that Machu Picchu receives a lot of rainfall, and that the amount varies greatly between the dry and wet seasons.
3. Ask students to think about what problems large amounts of rain would create in a mountainous setting. [Steep slopes would create rapid water runoff during rains, causing soil erosion and landslides.]
4. Ask students how building terraces would prevent water runoff and soil erosion. [Terraces create flat surfaces that allow rainwater to be absorbed into the ground. They also channel water runoff to reduce erosion.]
5. Explain that one reason terraces were especially important at Machu Picchu was that the Incas grew corn there to make *chicha* beer. Because corn has thin, fragile stalks, it grows best in flat fields like

those of the American Midwest. What would happen if corn was planted on a steep slope? [The fragile stalks would break easily in a heavy rainstorm.]

6. Ask students who built the terraces at Machu Picchu. (refer to background article “The Incas,” Section VII) [mita workers]
7. Explain to students that they will be dividing into teams to build an agricultural terrace similar to those at Machu Picchu. Their goal is to build a terrace that will absorb the most water and have the least amount of soil erosion.
8. Divide the class into teams. Tell them that they will have two class periods to design and build a terrace. Their goal is to create a structure that absorbs the most water. The team that builds a terrace that retains the most water wins. Teams will also be scored on how effective their structure is in holding up the straws (stalks of corn). The team with the highest number of straws that wash away loses.
9. Each terrace is to be slanted at a 45-degree angle. Have students prop the poster board on a chair or low table to create a 45-degree angle. The lower end of the poster board should be in the plastic tub that will catch water when it is poured over the terrace.
10. Allow time for teams to design and construct their terraces.
11. During the last 15 minutes of the second class period, have students take turns pouring water down their terrace (slowly, one cup at a time). Each group should measure the water runoff from their terrace. Which group’s terrace had the least runoff? The most straws left standing? They are the winners of the terrace construction contest.

Shortcut Activity

If you choose this activity, do it at the beginning of the lesson before your discussion of terracing.

Materials

Heavy-duty aluminum foil, plasticized poster board, cotton balls, large tub.

Procedures

1. Challenge students to build a structure on a sloping surface that will absorb the most water possible.
2. Divide the class into teams of four. Give them the plasticized poster board, heavy-duty aluminum foil and cotton balls. Tell them that they are to devise a structure that will absorb the most water possible when the poster board is positioned at a 45-degree angle.
3. During the last 15 minutes of class, have students take turns pouring water down their structure (slowly, one cup at a time). Each group should measure the water runoff from their terrace. Which group’s terrace had the least runoff?
4. *Closure:* Ask students what structure they saw in the exhibition that served the same function as their structure. [terraces]