How does Earth's natural processes contribute to the creation of Hamilton Pool?

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Hamilton Pool near Austin, Texas

Student

How does Earth's natural processes contribute to the creation of Hamilton Pool?

1. *Look at the poster picture. Discuss with a partner what you observe in the picture. Make notes of your discussion.*

2. *In the chart below, list the different features that you observed and discussed from the poster image. Describe how you think these features contributed to the formation of Hamilton Pool.*

In the poster, I see...	*I think this feature helped create Hamilton Pool by...*

3. *Do you think Hamilton Pool always looked like the poster picture? Explain why or why not.*

Teacher

Hamilton Pool – Exploring Earth's systems and natural processes.

Image Information: The poster image shows Hamilton Pool in Travis County, TX. Known as a collapsed grotto, it was created when the subsurface rock was eroded by flowing underground water, leaving a large limestone dome over an underground pool. The overhead dome eventually collapsed, exposing the pool, and leaving the limestone overhang. The process of erosion continues to wear away at the rock under the surface limestone, creating the overhang. The overhang continues to periodically collapse as erosion continues beneath it. This process has been occurring for about the last 100,000 years, moving the waterfall in the picture upstream a little further after each event. The resulting pool of water is now a local tourist attraction where visitors can swim in the blue-green water.

Question: *How does Earth's natural processes contribute to the creation of Hamilton Pool?*

Possible Student Answers: *Students may include some of the following poster features:*

In the poster, I see...	*I think this feature helped create Hamilton Pool by...*
Waterfall/flowing water	• Water fills the hole and creates the pool; • Flowing water causes erosion to wall of overhang; • Flowing water wears away/carries away sand, soil, small rocks from the pool
Rain from clouds	• Adds more water to the pool; • Rain causes more erosion, perhaps adding more debris like sand and silt to the bottom of the pool and filling it in; • Rainwater could be acidic and cause chemical weathering of the rock (limestone) creating the overhang
Rocks at edge of pool	• Large flat rocks look like they could keep water from seeping into the ground by forming a barrier
Trees/plants	• Leaves can sink to the bottom of the pool and fill it up • Tree roots help break up rocks (weathering)
Railing under overhang	• People made changes to the area around the pool
Overhang	• Looks like the rock was removed from underneath the ledge, perhaps by natural process (erosion) or man-made
Plants growing on rocks on the underside of overhang	• Their roots can open up cracks in the small rocks where water can seep into them (weathering)

Support the Phenomenon:

NGSS Science and Engineering Practices #3 – Planning and Carrying Out Investigations: In K-2, students **collect observations** and measurements **as evidence;** in 3-5, students **conduct an investigation to produce data for evidence to answer a question**; in 3-5 students, **make observations and take measurements to produce data for evidence to explain a phenomena**; in 6-8, **students plan and conduct investigations** using appropriate tools and models **to gather data to explain phenomena;** in 9-12, students **plan an investigation to produce data as evidence to support a claim and explanation for phenomena.**

Materials: Grades K-5: 2-3 different small rock samples (include at least one limestone sample such as garden store limestone rocks); white vinegar (or other mild acidic solutions); observation dish or container (one for each rock sample being used); goggles.

For Grades 6-12: students have 3-4 different samples of limestone; observation dishes (glass); goggles. Students should use more sophisticated tools (scales, timing devices, laboratory ware) and use a stronger acid (e.g., weak hydrochloric acid);

[**Note:** Since vinegar/hydrochloric acid emits a strong odor, it is recommended to do this activity either outside or in a well-ventilated room to reduce student exposure to fumes.]

- In K-2, have students observe and record what happens when each rock sample is exposed to the vinegar. Focus on collecting their observations (fizzing/ bubble formation) and recording that as their evidence. Students should recognize that some rocks (limestone) are affected by the vinegar and others are not. Have them hypothesize that different materials have different properties.
- In 3-5, have students make detailed observations and take measurements (e.g., size, weight) of their rock samples, and use outside sources to perhaps identify them. Have students record their observations when the rock samples are placed in the vinegar (fizzing/ foaming/ bubbles). Students should recognize that some rocks (limestone) are affected by the vinegar and others are not. Have them hypothesize that different materials have different properties.
- In 6-8, students devise a plan to determine if all the samples of limestone have the same or different chemical composition. Provide students with several different limestone samples. The focus is on their plan; how they conduct it, and how they use their results as evidence to back up their claim of similar or different compositions.
- In 9-12, students research properties of limestone, devise a plan, conduct tests, and collect experimental data to determine if the samples of limestone have the same or different chemical compositions. The focus is on the collection of experimental data and its use as evidence to back up their claim of similar or different chemical compositions of their samples.

More information: To learn more about Hamilton Pool Reserve, visit **parks.traviscountytx.gov** or visit **GeologyScience.com** to learn more about the uses and composition of limestone.