

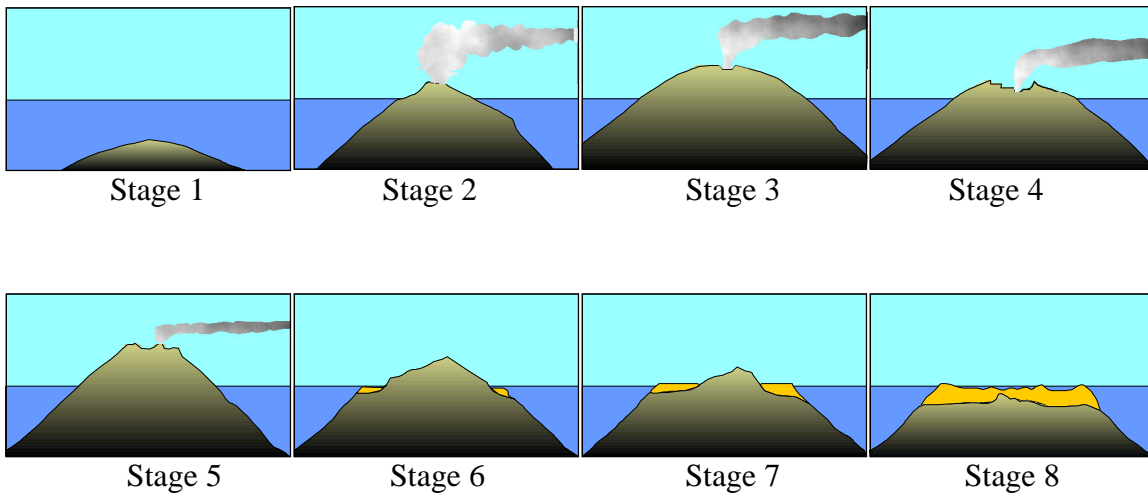
Life of an Island

Grades: 4 – 6

Focus Question: Why are the Northwestern Hawaiian islands so much smaller than the main islands of the Hawaiian archipelago?

Lesson at a Glance: Students will learn about the evolution of a volcanic island from origin to erosion. They will be able to determine the relative ages of the Northwestern Hawaiian Islands given their position in the archipelago.

Key Concepts: Volcanic islands form over a hot spot on the ocean floor. Islands form and erode in eight stages (1) deep submarine stage, (2) shallow submarine stage, (3) subaerial shield-building stage, (4) post-caldera stage, (5) erosional stage, (6) stage of reef growth, (7) stage of post-erosional eruptions, and (8) atoll stage. Refer to the website for an animation of this process.



The relative age of an island or atoll can be determined based on its state of growth or erosion. The Hawaiian archipelago rides on the Pacific tectonic plate that is moving in a northwesterly direction. The oldest islands in the archipelago are located northwest of the main islands, and the youngest island (Lo‘ihi) is forming under the ocean off the eastern coast of the island of Hawai‘i.

Objectives: Students will be able to:

1. Identify the eight life cycle stages of an island.
2. Identify the stage of an island based on given criteria.

3. Demonstrate their understanding of the life cycle of an island by illustrating the process and creating their own names for the eight stages.
4. Identify the stage of an island based on photographs.

Time: 30 – 45 minutes

Materials: NWHI website, photographs of selected islands in the Hawaiian archipelago.

Preparation and Procedure:

Teachers should explain the concept of plate tectonics and hot spots to show how volcanoes are formed over a single spot in the ocean floor, become islands, and drifted toward the northwest. A map that shows the submerged ridge that connects the islands and atolls in the archipelago can be used to illustrate this concept. The cross-section of the Hawaiian islands in the NWHI map can also be used to stress this point. Aerial photographs of the NWHI can be used to illustrate the different stages of growth and erosion of an island. These photographs can be downloaded from the website. Teachers should begin by showing photographs of eruptions on the island of Hawai'i as an example of an island in the shield-building stage. Systematically working through photographs of the islands from the southwest to the northeast will demonstrate the changes in volcanic activity and island shape and size due to erosion.

Teacher Background:

Volcanic islands move through eight stages of growth and erosion. Due to the movement of the Pacific tectonic plate on the floor of the Ocean, the islands on the Northwest end of the archipelago are significantly older than those on the southeast end (the main Hawaiian islands), since they formed over the hot spot first. The island of Hawai'i is approaching mid-life, while Lo'ihi (still submerged) is still in the deep submarine stage. By contrast Kure and Midway atolls are in the final stages of the life cycle of an island. The formation of ringing reefs combined with gradual sinking and erosion of an island cause it to eventually disappear from the surface of the ocean. During this process, reefs grow vertically (upward) and begin to surround the island, eventually becoming separated from the island by a lagoon. If sinking continues, the island disappears and only a circular reef remains --- an atoll. The website provides additional background information about each of the islands and atolls of the Northwestern Hawaiian Islands.

Extensions:

Students can use the NWHI website to monitor the progress of the research team's rapid environmental assessment, and to see new photographs of the islands and atolls from Nihoa to Kure.