LITTLE LŌʻIHI

Grade 3

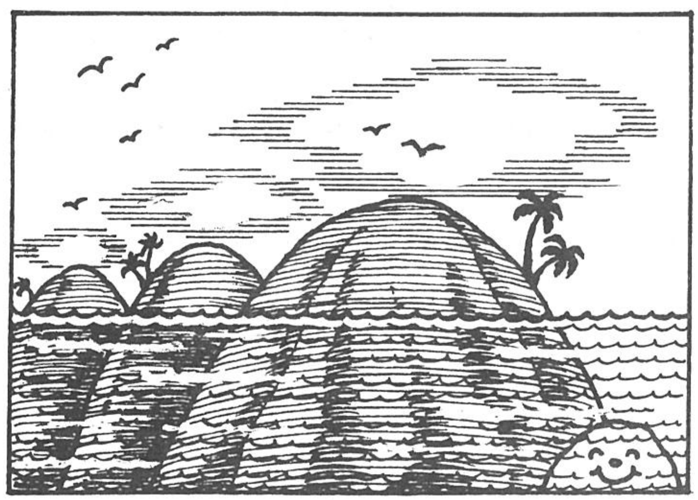
Lesson at a Glance
After helping to build a model of Lōʻihi Seamount and their own island, students graph and compare the elevations of Lōʻihi and some major Hawaiian volcanoes.

Key Concepts
A new volcano, Lōʻihi, is growing southeast of Hawaiʻi Island. As islands age they become smaller.

Objectives
Students will be able to:
1) Locate the area where Lōʻihi is forming on a map.
2) Graph the height of Lōʻihi in relation to other Hawaiian volcanoes.
3) Draw the Islands in profile, showing their elevations in relation to one another.

Time
two class periods

Subject Areas
science, Hawaiian studies, math, art



Materials
graph sheet (provided)
map of Hawaiian Islands (provided)
2 clear rectangular containers approximately 22 cm (9 in) high
black gravel or fish tank gravel
blue food coloring
pitcher of water
crayons
construction paper
blue watercolor paint
paintbrushes
newspaper

Preparation
Add blue food coloring to the water. There should be enough water to fill the large clear container.

Teacher Background

The Hawaiian Islands are made up of volcanoes that are believed to form over a relatively stationary "hot spot" in the Earth's mantle. As the Pacific plate slowly moves to the northwest, it carries the older volcanoes with it. Over time, new volcanoes will erupt to create new islands at the southeastern end of the chain, where the "hot spot" is believed to be located.

Our youngest and still volcanically active island is Hawai'i. Less than 29 km (18 mi) to the southeast of Hawai'i is an active **submarine** (below sea level) **volcano** that may one day be a new island. It is called **Lō'ihi Seamount**, and has probably been active for less than 500,000 years. The main base of the volcano is 4,023 m (13,195 ft or 2.5 mi) below sea level, while the summit is approximately 950 m (3,100 ft) below the ocean's surface. From floor to summit, Lō'ihi is estimated to be 3,054 m (10,017 ft or 1.9 mi) high.

Lō'ihi apparently grows as lava flows from its summit **caldera** (a crater at least 1.6 km, or 1 mi wide) and a **rift zone** which is a large crack that extends on both sides of the caldera in a northwesterly to southeasterly direction. Within the summit caldera are two craters. If activity on Lō'ihi continues at its present rate, it will break through the ocean's surface in approximately 10,000 years.

The elongated rift zone of Lō'ihi is marked by areas where large chunks of material are continually slipping off. This is the primary erosional activity on Lō'ihi. While this type of erosion also takes place on land (particularly after a heavy rain saturates soil on steep slopes), it occurs more quickly under water.

Note: Lō'ihi is the only active seamount in Hawaiian waters; there are quite a few extinct seamounts including the Emperor Seamounts north of Kure Atoll.

Island	Highest Point	Approximate Age (years)	Elevation Above Sea Level (rounded to the nearest hundred)
Ni'ihau	Pānī'au	5,000,000	400 m
Kaua'i	Mount Kawaikini	4,700,000	1,600 m
O'ahu	Mount Ka'ala	3,500,000	1,200 m
Moloka'i	Kamakou	1,500,000	1,500 m
Lāna'i	Lāna'ihale	1,500,000	1,000 m
Kaho'olawe	Moa'ulanui	1,000,000	500 m
Maui	Pu'u'ula'ula	700,000	3,100 m
Hawai'i	Mauna Kea	400,000	4,200 m
	Lō'ihi	still forming	(below sea level) 950 m

Teaching Suggestions

1. Examine the map of the Hawaiian Islands with the class. Ask students how old they think the Islands are, and give them the ages of Kaua'i, O'ahu, Hawai'i, and your island. Ask students why they think Hawai'i is so large. (It is built of five volcanoes, which is more than any other island, and it is too young to have worn away much.)

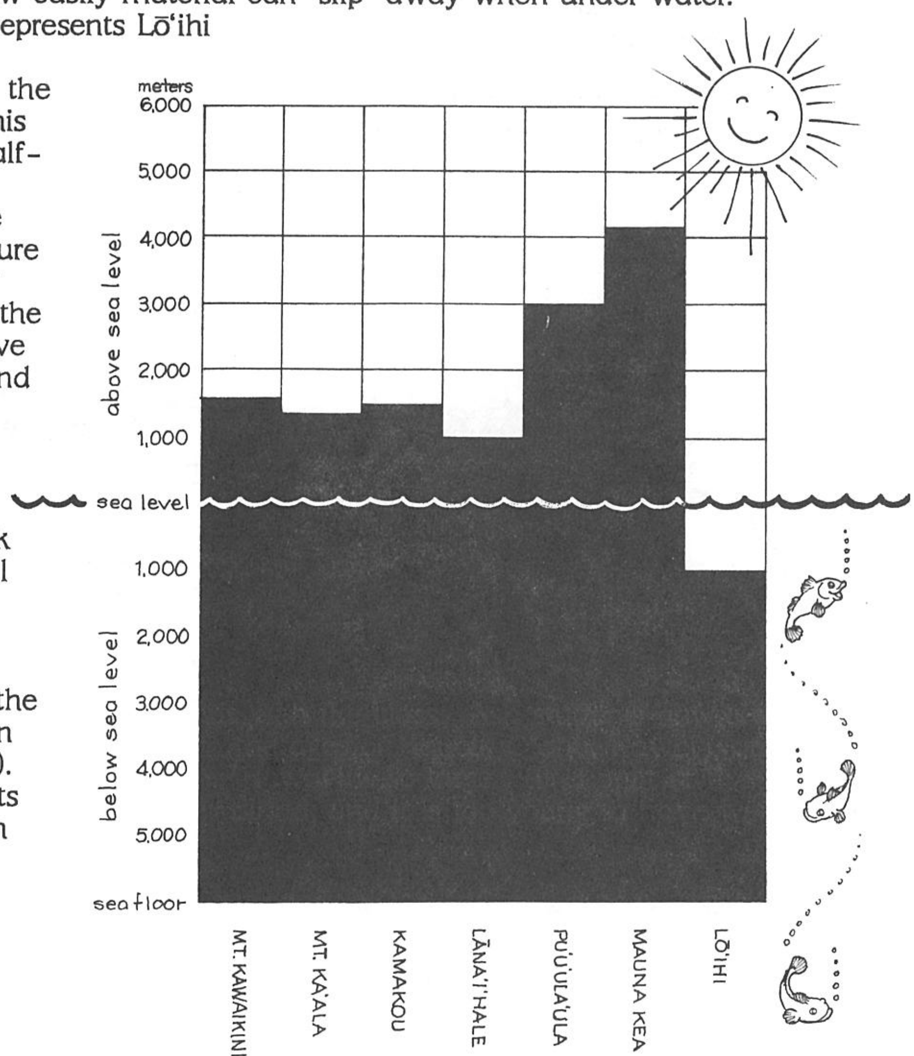
2. Ask students where they think the next island might form in the chain. Indicate the area off the southeastern tip of Hawai'i where Lō'ihi Seamount is located.

3. Gather students around the clear containers, explaining that together you will make a model of Lō'ihi and your own island. Ask a volunteer to pour the blue water into the first container until it is about one-quarter full. Then ask another student to gently pour gravel into the container. When the gravel reaches above the water line, mold a caldera in the center.

4. Carefully add more water until the summit is about one-third below the water line. The gravel will spread out slightly. Explain that Hawaiian volcanoes are shield-shaped, and point out how easily material can "slip" away when under water. Explain that this model represents Lō'ihi

5. Repeat the exercise with the second container, only this time pour water to the half-way mark and build as many volcanoes as there are on your island. Be sure that only the very tops of the volcanoes are above the water line. Note: The five volcanoes of Hawai'i island will be difficult to make unless your container is very large.

6. Ask students if they think that the oldest islands will have the smallest volcanoes. Then list the elevations of the highest points of each island on the board (refer to the table in the Teacher Background). Distribute the graph sheets and ask students to graph the elevations.

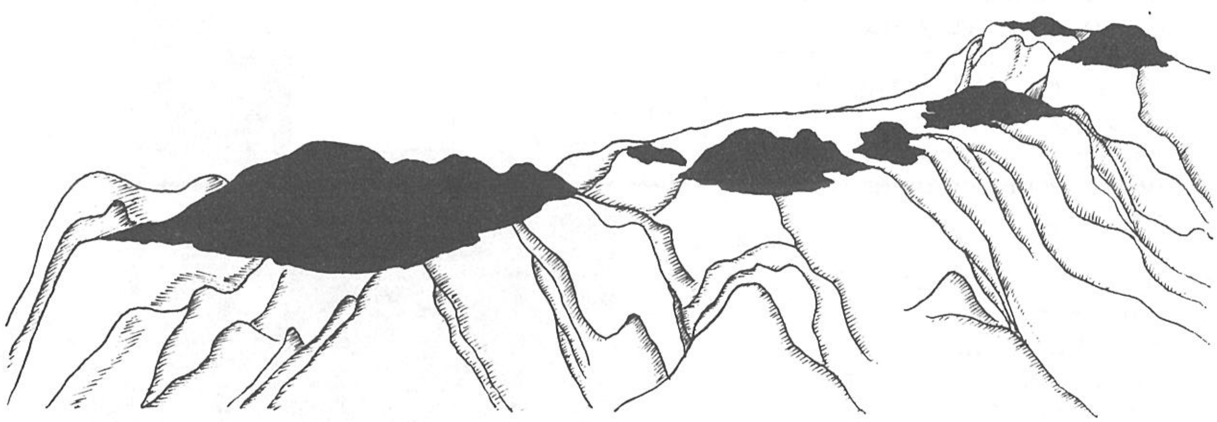


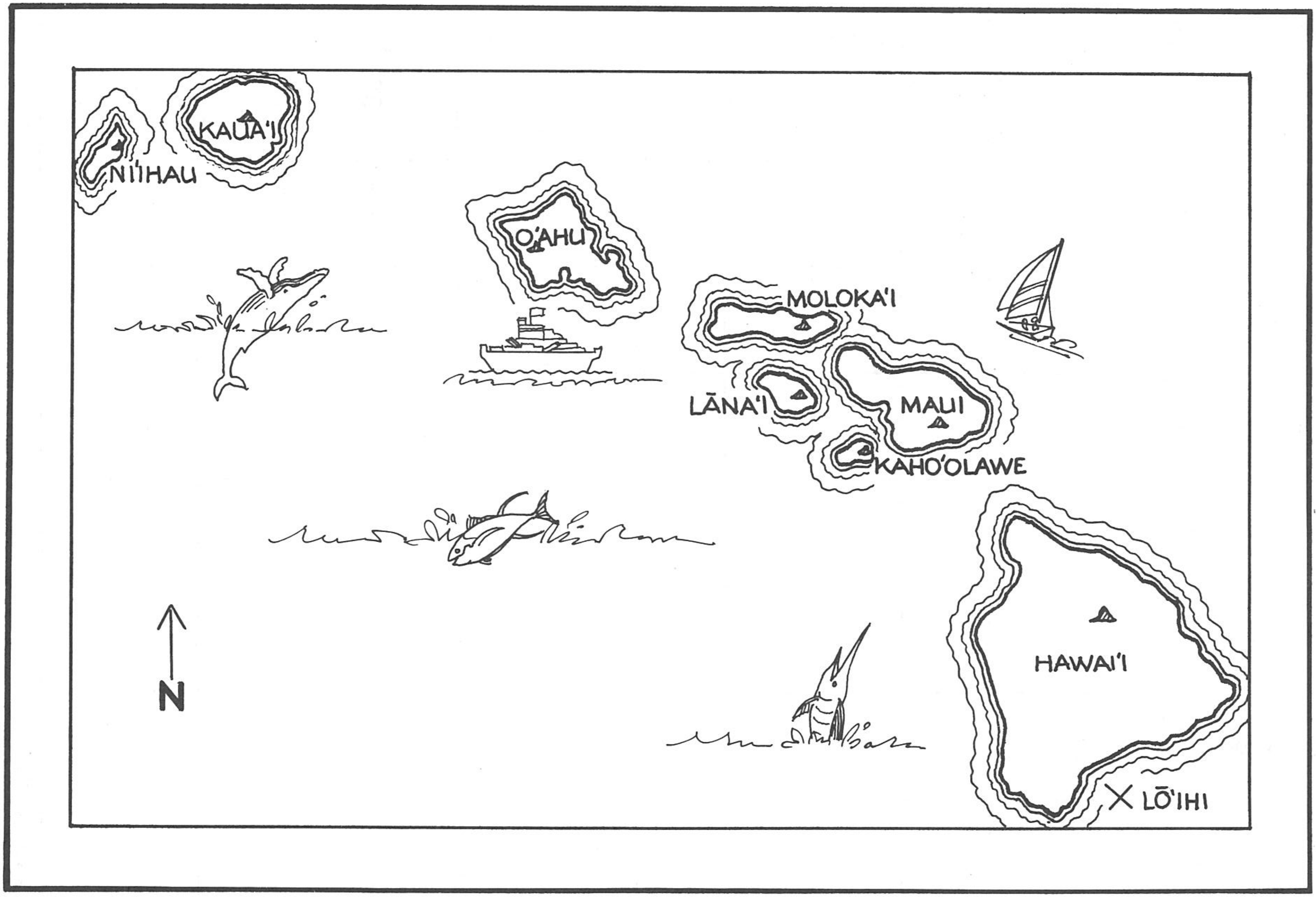
✓ 7. Distribute construction paper and dark crayons and ask students to draw the islands in profile using the information from the graph. Have them mark sea level with a pencil and draw fish below sea level, trees on land, and birds in the sky.

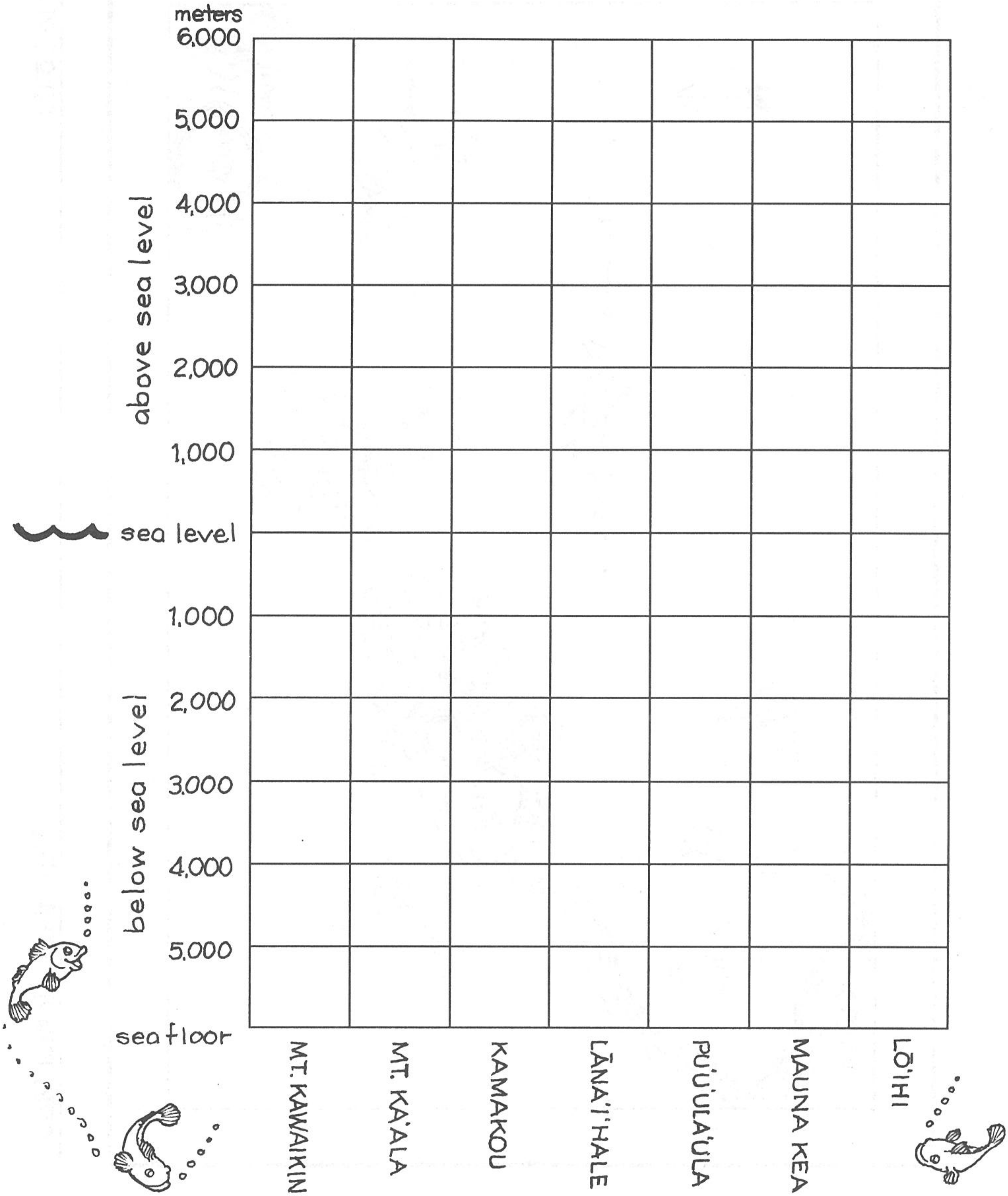
8. Distribute newspaper and blue watercolor paints, and have students paint in the sea! The blue watercolor will permeate the tiny spaces left by the crayon the same way water permeates our volcanic island homes.

Extended Activities

- Use creative dramatics to portray the birth of Lō'ihi. Have students assume the roles of the caldera, the pit craters and the rift zone. Other students could hold ribbon to represent sea level, while students representing lava burst through the rift.
- Alternatively, use a cloth sheet to represent Lō'ihi. Have students hold the edges of the sheet, letting the center sag down. On your command "Rise, Lō'ihi," have students begin to ripple the sheet higher and higher until their hands are as high as they can go. Then command, "Erode," and have them slowly let the island sink or wear away.
- Build a classroom model of Lō'ihi using papier mache. Make another model of your island from the sea floor to the summit, and mark where sea level would be.




KAUA'I
NI'IHAU
O'AHU
MOLOKA'I
LĀNA'I
MAUI
KAHO'OLAWE
HAWAI'I
LŌ'IHI
N


meters
6,000
5,000
4,000
3,000
2,000
1,000
above sea level
sea level
1,000
2,000
3,000
4,000
5,000
below sea level
sea floor
MT. KAWAIKINI
MT. KA'ALA
KAMAKOU
LĀNA'I'HALE
PU'U'ULA'ULA
MAUNA KEA
LŌ'IHI