2. Shaping Earth's Surface

Topography is reshaped by the weathering of rock and soil and by the transportation and deposition of sediment. As a basis for understanding this concept:

a. Students know water running downhill is the dominant process in shaping the landscape, including California's landscape.

b. Students know rivers and streams are dynamic systems that erode, transport sediment, change course, and flood their banks in natural and recurring patterns.

c. Students know beaches are dynamic systems in which the sand is supplied by rivers and moved along the coast by the action of waves.

d. Students know earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats.

Dear Friends in California,

In my last letter I introduced the idea of Plate Tectonics. In this letter I will talk about how our Earth's surface is shaped.

Of course the very big shapes—the continents and your Sierra Nevada are the result of plate tectonics. Your California Central Valley resulted from a very complicated collision between the Pacific Plate and the North American plate with another plate, called the Farallon plate, caught in the middle. This went on for millions of years with the Farallon plate getting slowly destroyed as it was pushed under the North American plate. Along the way it raised your Central Valley above sea level and eventually shoved the Sierra Nevada up on its eastern edge.

While this was happening, other forces besides plate tectonics were shaping the surface. As mountains grew higher, the slope that was becoming the Sierra was getting steeper and steeper. What happens to steep slopes? Well, the water runs down them faster and faster. So as the mountains rose the water eroded valleys on the side of the mountains. The ditches cut by the erosion grew deeper and deeper. They became your Tuolumne River, Stanislaus River, Mokelumne River and so forth. The rivers carved the valleys you know today.

But what about Yosemite? Ah, a slightly different story. It was carved by water, all right, but mostly not by liquid water. It was carved by ice in the form of glaciers.

Glaciers are positively brilliant at pushing the landscape around. They did a spectacular job in Yosemite. But those glaciers were only a tiny fragment of ice sheets that expanded to cover almost all of Canada and large parts of the Unites States in the last glaciation. Those glaciers reached their greatest extent somewhere between 15 to 22 thousand years ago.

You can easily learn much more about how those glaciers created the Great Lakes by going to this entertaining slide show made for you by Michigan State University.

http://www.msue.msu.edu/objects/content_revision/download.cfm/item_id.211898/workspace_id.26697/How%20The%20Great%20Lakes%20Were%20Formed%20%28Video%29.swf/

When the rivers are digging valleys into the mountains, they have to put all that material somewhere. Rocks are ground into pebbles and then into sand. The sand winds up on the ocean beaches. The waves and the ocean currents move the sand around from beach to beach. Everything is always changing.

Some of what the rivers bring down is silt which may be deposited in places where the rivers run more slowly. This is some of the richest agricultural land in the world. The civilization of ancient Egypt was built on the rich soil that the River Nile brought down from Central Africa.

Today, and for the last decades, the average temperature of the earth has been warming. Great glaciers in Greenland, the Himalayas, the Arctic and Antarctic are melting into the sea. As a result the oceans are rising to levels not seen since the development of civilization. This will result in the flooding of some islands and many low-lying cities.

Since prehistoric times people have been faced with floods, earthquakes, volcanic eruptions, and tsunamis. Whole civilizations have been challenged by natural changes and some have disappeared. You young people will also be challenged in your lifetimes by natural disasters and you will need the very best science possible to help you maintain a rich life.

Your friend from the past,

Joseph Priestley