

Walking along the shores of the Columbia River, I watched as a large slab of sandy soil slumped off into the swift river. The murky water swirled and spun as the current carried the sediments away. A hundred feet or so downstream a large sand and gravel bar jutted out into the water. Never before in my experience had a geologic principle illustrated itself so clearly and vividly as it did at that moment. Just as the river destroys the earth's surface as it meanders and erodes its shoreline, it also creates new surface with those same sediments—like the sandbar I could see downstream. I was amazed at these complementary processes and more than a little embarrassed I had not appreciated their full power before. Geology was indeed an interplay between forces that destroy and forces that create. Sometimes the struggle is played out in a single event like a volcanic eruption that destroys mountain peaks and almost immediately creates and shapes new landscape below. Sometimes the processes are less proximate in space and time (as with the meandering river example), and it takes some directed looking to find and connect them. Because these processes were so basic and fundamental, they represented a powerful recognition and reshaping of my geological understanding. But it took me several months to align and reconstruct my pedagogy with them.

In planning my course, I generated the following simple math problem and imagined presenting it to my geology students on the first day of class.

*The average rate of erosion of the earth's surface is about one inch every 100 years. If the earth averages 5,000 feet above sea level, how long will it take to totally wear the features of the earth down to sea level?*

Perhaps after doing the multiplication, they would wonder, “If this is true, how come the earth isn't a flat, muddy mess?” If I could get my students to understand that the earth's surface is constantly being reshaped by creations and destructions, that central insight could motivate the rest of the course content and serve as the frame on which to hang a great deal of other knowledge. Using the interplay between creation and destruction as our organizer, I led my students through a detailed study of the physical earth and I highlighted creation and destruction at every turn. Volcanoes showed us their destructive power but also helped us to understand the growth of the Hawaiian Islands and their amazing fertility. The erosive power of continental glaciation was illustrated very clearly by the intense “carving” and “gouging” of our local area but also explained the many small hills of gravel deposited by the retreating ice. Tectonic stresses explained horribly destructive earthquakes but also the continuously rising Himalayan Mountains. Soon my students were actively looking for the Yin and the Yang of geology—the destructive and creative forces in nature—in both the curriculum and the world around them. Geology had become something to see and appreciate rather than something to memorize and confound.