

Welcome to Earth Matters – field notes on the geology of New Mexico’s Enchanting Landscapes. Celebrating Earth Science Week, I’m Andy Jochems.

It’s clear that rivers and streams are dynamic features of Earth’s landscape. Anyone who has ever rafted or kayaked the Rio Grande or Rio Chama can describe their awesome power, especially if they’ve been soaked by a rapid. But how exactly do river processes evolve over time?

Rivers, streams, and even arroyos go through cycles of erosion, the wearing away of Earth’s surface, and aggradation, the laying down of sediment. These cycles change the elevations and slopes, or grades, of streambeds. One dramatic example of an erosional landscape is the deep Rio Grande gorge west of Taos.

It’s not surprising that such cycles are partly controlled by climate – for example, wetter periods supply more water to rivers, giving them more power to erode or incise their beds. On the other hand, dry periods result in low amounts of water, preventing rivers from easily moving sediment downstream, and therefore facilitating aggradation in many cases. Other factors that influence erosion and aggradation include the type of rock that rivers flow across, the vegetation growing along their banks, and even human activity. The processes behind the evolution of rivers connect all of Earth’s systems: the geosphere, hydrosphere, atmosphere, and biosphere.

How quickly or slowly do these processes occur? Here in New Mexico, we may see rapid erosion when monsoon floods undercut arroyo banks, carrying away collapsing sediment. But aggradation can take longer, often with much less than a millimeter of sediment deposited per year. And rivers aren’t always eroding or aggrading – they can also go through stable periods, with no significant change in their grade.

The next time you enjoy one of the many beautiful rivers, streams, or arroyos in our state, consider that what you see is just the latest result of a complex, cyclic history!

Celebrating Earth Science Week; I’m Andy Jochems of the Bureau of Geology at New Mexico Tech.