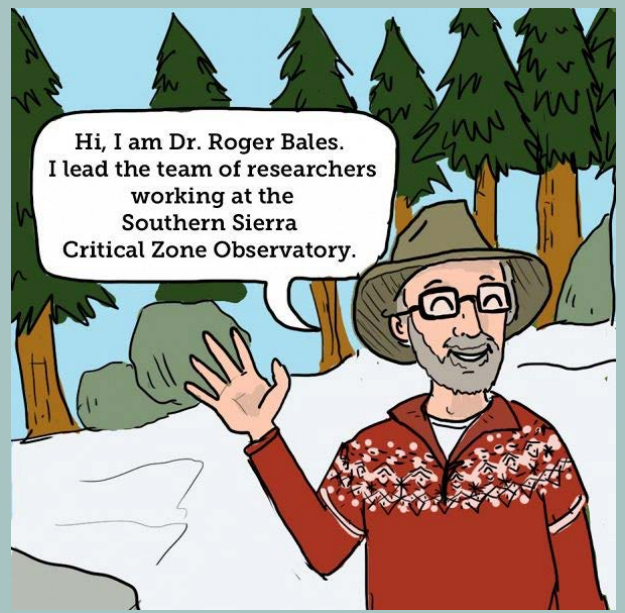


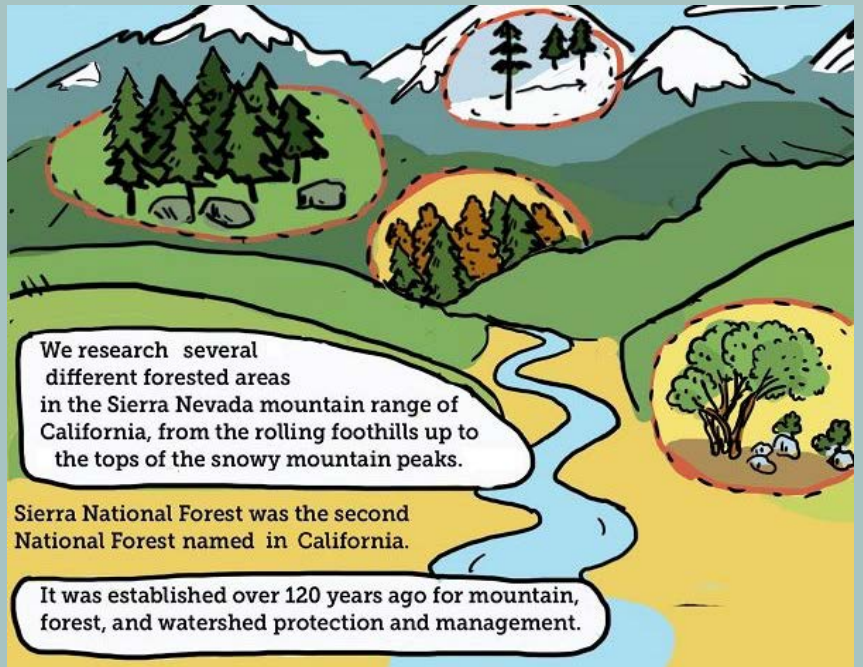
Southern Sierra Critical Zone Observatory



Hi, I am Dr. Roger Bales. I lead the team of researchers working at the Southern Sierra Critical Zone Observatory.



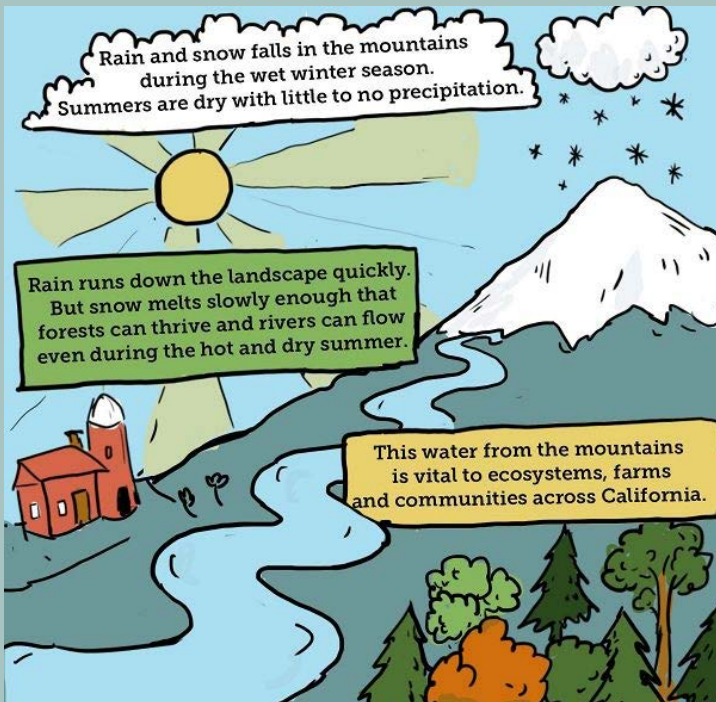
Sierra Nevada is Spanish for "snow-covered mountain range". Snow and its interactions with the critical zone are very important for California's ecosystems and society.



We research several different forested areas in the Sierra Nevada mountain range of California, from the rolling foothills up to the tops of the snowy mountain peaks.

Sierra National Forest was the second National Forest named in California.

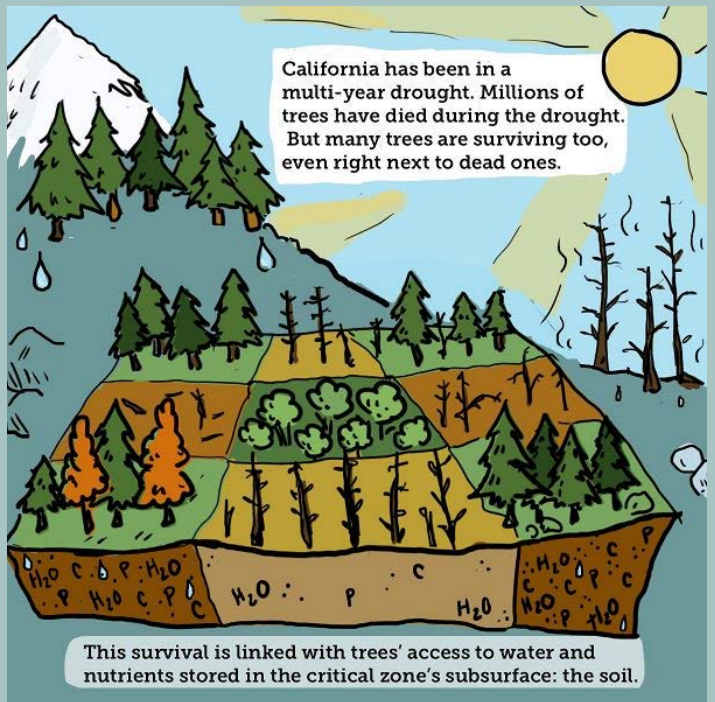
It was established over 120 years ago for mountain, forest, and watershed protection and management.



Rain and snow falls in the mountains during the wet winter season. Summers are dry with little to no precipitation.

Rain runs down the landscape quickly. But snow melts slowly enough that forests can thrive and rivers can flow even during the hot and dry summer.

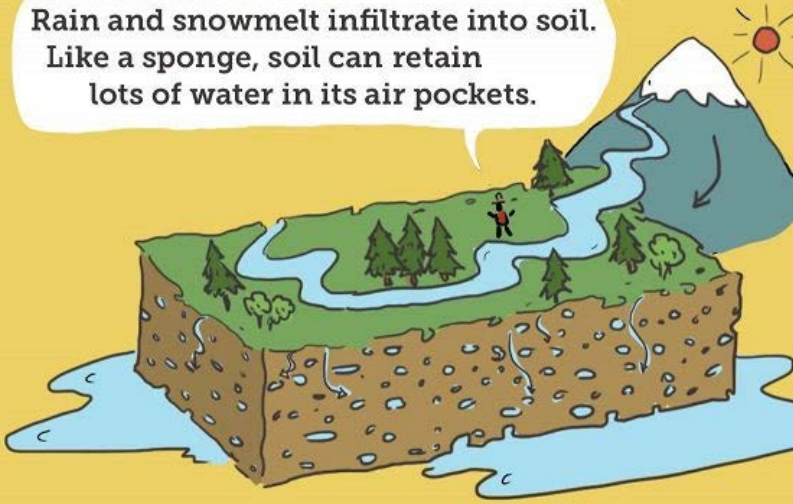
This water from the mountains is vital to ecosystems, farms and communities across California.



California has been in a multi-year drought. Millions of trees have died during the drought. But many trees are surviving too, even right next to dead ones.

This survival is linked with trees' access to water and nutrients stored in the critical zone's subsurface: the soil.

Rain and snowmelt infiltrate into soil.
Like a sponge, soil can retain
lots of water in its air pockets.



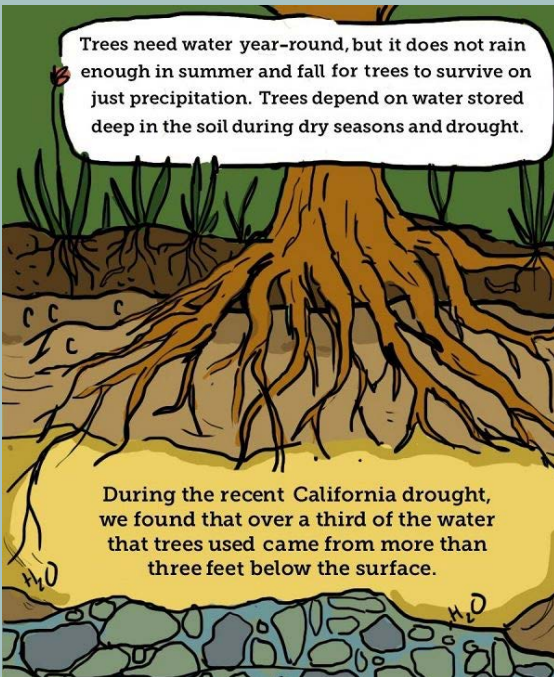
Soil is a unique part of nature and the
critical zone. Soils sustain life by regulating
the water supply, storing carbon, supporting
plant growth, recycling wastes and nutrients,
and housing billions of life forms.



Not all soils are the same. We are finding that
soil depth and texture control how much water,
carbon, and nutrients soils can hold.

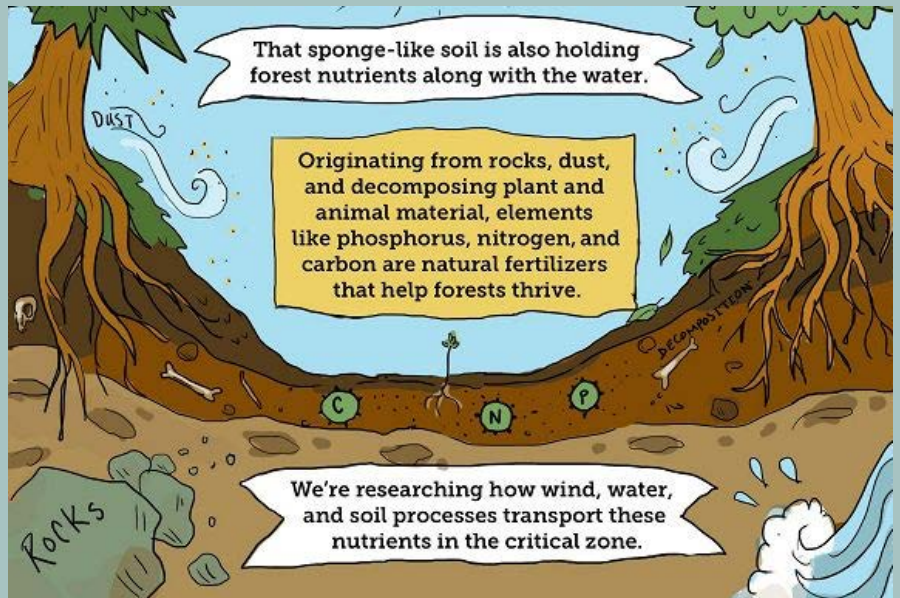
These soil properties change across the Sierra
and we can predict where.

Trees need water year-round, but it does not rain
enough in summer and fall for trees to survive on
just precipitation. Trees depend on water stored
deep in the soil during dry seasons and drought.



During the recent California drought,
we found that over a third of the water
that trees used came from more than
three feet below the surface.

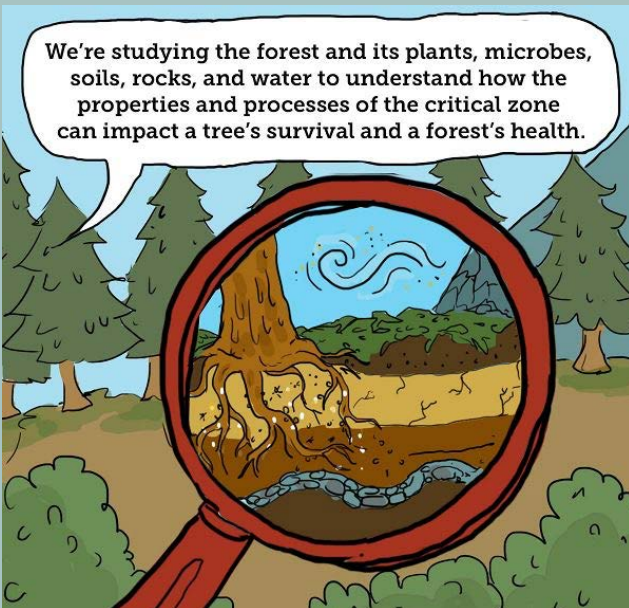
That sponge-like soil is also holding
forest nutrients along with the water.



Originating from rocks, dust,
and decomposing plant and
animal material, elements
like phosphorus, nitrogen, and
carbon are natural fertilizers
that help forests thrive.

We're researching how wind, water,
and soil processes transport these
nutrients in the critical zone.

We're studying the forest and its plants, microbes,
soils, rocks, and water to understand how the
properties and processes of the critical zone
can impact a tree's survival and a forest's health.



Knowing more about how soils are
structured, water flows, and forests function
in the critical zone allows people to
better manage and preserve this ecosystem.

