

The Resilience of Mountain Plants and their Role in Sustaining Ecosystem Services

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Project Abstract:

Mountain plants are diverse, are evolved for stress and are unique from species in other ecoregions. As we dig deeper, literally and figuratively, into the traits and functions of mountain plants, the Berkeley Lab Watershed Function SFA is exploring hillslopes, river corridors, and elevational gradients to characterize the role of plants in mountain watershed function. Each new insight leads to further questions and redefining our thinking about mountain plants. Where we first began with a focus on the impact of drought conditions following earlier snowmelt, we've expanded to explore ways that many mountain plant species hold on to green leaves despite low soil water availability in surface soils, with some species maintaining growth and evapotranspiration even during dry times. Other species slow rates of growth and evapotranspiration, but do not senesce. Relatively few species brown down earlier, thus green cover may not reflect plant function. For mountain plants evolved for stressful conditions and short growing seasons, there are tremendous benefits to being ready to grow again as monsoon rains begin to fall. Using remotely sensed data from hillslope to watershed scales we are evaluating how to scale these observations and determine the Watershed Factors that influence plant species distributions and response. We are also comparing plot scale and remotely sensed observations with model predictions of 'monsoon rescue' of plant productivity following foresummer drought. The ability of mountain plants to withstand periodic drought prior to the onset of monsoons is an important example of their resilience to interannual variability in the hydrologic cycle and climate change. These responses are poorly understood but have major consequences for water partitioning, carbon and nutrient flux in these systems.