

The Role Of Talus Slope Microbial Activity On The Flux Of Nitrate To Surface Waters

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Abstract. Nitrogen deposition to the Colorado Front Range is among the highest in the state of Colorado, due to a combination of urban and agricultural emissions. The Loch Vale catchment of Rocky Mountain National Park is exhibiting symptoms of nitrogen saturation, a condition in which excess inorganic nitrogen is exported from an ecosystem. Nitrogen saturation can lead to the loss of forest health, a decrease in biodiversity, and acidification of surface waters. The occurrence of nitrogen saturation increases the urgency to understand the processes controlling the flux of nitrogen to surface waters. Rocky Mountain catchments are the source of water for much of the western U.S., thus the health of these systems is extremely important.

Talus slopes have been shown to be a large source of water and nitrate to surface waters. A recent study found evidence of active microbial communities in the small soil pockets in and underneath talus slopes, and it has been suggested that the difference in the isotopic composition of nitrate between deposition and surface waters is due to soil microbial transformations. However, the timing and flowpath routing of talus slope runoff is poorly understood. These factors may have a significant influence on the effects of microbial activity on surface water nitrate concentrations.

I hypothesized, and early results suggest, that the major source of water to a small subalpine pond in Loch Vale is from a bordering talus slope. Combining a hydrologic model of the pond's catchment with subsurface water chemistry and mineralization rates of all water source areas will lead to an understanding of the relative importance of talus slope microbial activity on the flux of nitrate to surface waters in Rocky Mountain National Park.