

Gravelly Landscape Collaborative
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SNOW, TREES and WATER

Our viewshed is blanketed white, getting going takes more time, boots by the door, time to scrape the windshield. This is good news for southwest Montana, our water year has begun. This is when we start counting, paying attention and planning. Our water supply is dependent on our snowpack. Yes, we do have rain, but the snow is what sustains our rivers, crops, fisheries and livelihoods.

Snowpack matters, the deeper and wetter (snow moisture level) the better. But vegetation also matters. The forest conditions in the upper watershed play an important role in our water year in ways that may not be apparent.

The US Geologic Survey researches the relationships of snowpack, forest cover and climate, "Forests strongly influence snow processes and affect the amount and duration of snow storage on a landscape. Therefore, forest changes, from management activities or natural disturbances, have important consequences for spring and summer soil moisture availability, aquatic habitat, and water supply".

Tree canopy intercepts the snow and when the snow is stored above the ground it is more likely to be lost through sublimation, the process of snow turning to water vapor and skipping the liquid phase of the water cycle. With more trees, we find less snow accumulating on the forest floor. Surface flow and ground infiltration is reduced when snowpack is captured in the canopy. We also find tree wells where snowmelt has dripped down around the trunk to the ground. Tree wells are created by the sheltering effect branches have near tree trunks.

Wind also impacts how snowpack is built and maintained. Wind combined with forest conditions can have a dramatic impact on snowpack levels and these conditions can vary across the landscape depending on aspect and slope. It is important to note that wind can greatly increase snowpack and lead to prolonged runoff periods in some basins.

While tree covers has the impact of reducing snowpack it can also produce shade that prolongs the melting of snow. In this way, trees can have both a positive and negative impact on snowpack and its longevity. However, in higher elevations and colder climates canopy cover and the shading it provides is not as big of a driver than in warmer climates and mid elevation forests, "opening the canopy, perhaps at higher elevations, would lead to a longer-term effect on snow storage"(USGS).

The other more obvious impact forest cover has on our water budget is the water that trees consume from groundwater. There is variation based on size and species, but the numbers are impressive with a single large tree capturing and filtering up to 36,500 gallons of water per year and absorbing 36 percent of the rainfall it comes in contact with. While trees consume water they also obviously perform other vital important roles in the forest ecosystem including, reducing sediment runoff, providing habitat, capturing carbon and filtering pollutants.

These relationships are complex and interconnected. The Gravelly Landscape Collaborative approaches forest health and management in a holistic manner and works to understand these relationships. It is important to consider how changes in our forests affect our water supply and how these may change over time. Learning more and monitoring are keys to becoming better stewards of our natural resources. But it never hurts to have more snow.

USGS Webinar <https://www.usgs.gov/media/videos/how-will-forests-affect-mountain-snow-storage-warming-climate>