

Forests, Fires, and Watersheds

Functional watersheds are essential for healthy streams and clean water. Healthy forest watersheds absorb snow and rain, store and filter it in the soil, and yield clean water to streams and ground water. Forests must be renewed and cared for over time to sustain good watershed function. Conservation leaders have understood these simple truths for over 100 years.

Healthy forest watersheds function in dynamic balance. Soil and stream conditions usually vary within a limited range. They rebound promptly from natural disturbance events like wildfires and floods – just as healthy people rebound quickly from mild illnesses. On rare occasions, severe fires or floods can throw even healthy forest watersheds out of balance. Resilient forest watersheds usually recover from such “re-set” events within several years.

Fire is natural in the ecology of western forests. For example, most ponderosa pine forests are sustained by frequent, low-intensity surface fires that knock back undergrowth and promote open stands of large trees with grassy understory. On the other hand, lodgepole pine forests are commonly regenerated by infrequent but intense crown fires that kill the mature trees but promote abundant seed-fall (and aspen sprouting) to quickly establish the next forest. Natural fire cycles create diversity in the types, ages, and densities of trees. This diversity helps limit soil damage from severe fires.

Over many decades, people have made choices that have left forests less healthy and more prone to severe fires. In ponderosa pine forests, for example, a century of fire exclusion has let many trees crowd the forest and build up heavy fuel loads near the ground. In lodgepole pine forests, large natural and human-caused fires in the 1800s led to vast uniform tracts of mature, even-aged forests that are highly susceptible to beetle attacks and mega-fires.

In both cases, watershed function is intact as long as the forests do not burn. But recent forest fires have tended to be much larger and more severe than those in the past. Such severe fires bake the soil, throw watershed function out of balance, and lead to heavy erosion and sediment damage in streams.

A vivid example is the Buffalo Creek Fire of May 1996 (near Denver, CO). This fire severely burned the Spring Creek watershed because ponderosa pine forests were crowded with small understory trees and heavy surface fuels. Barren, water-repellent slopes were exposed to repeated heavy rain storms. Rapid runoff produced over a dozen 100-year floods in Spring Creek from 1996 to 2009. The watershed is still out-of-balance and not properly functioning. Several watersheds burned by the epic Hayman Fire of 2002 suffered similar results. How long these watersheds will remain out-of-balance is unknown.

Functional watersheds are vital to protect water resources from post-fire flood damage. Careful forest treatments can increase resilience to forest fires and help protect watershed function. Thinning, patch cuts, and prescribed fires conducted in strategic places over time create a diverse forest mosaic of tree types and ages that will temper the extent and severity of forest fires. Leaving out-of-balance forests alone poses high risks to watershed function, water supply, and the water storage and delivery facilities that now intersect most forests.