# Managing Colorado's Forests for Water Yield and Water Quality: Opportunities, Risks, and Constraints

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**Abstracts.** Forests occupy 32% of Colorado and provide most of the streamflow needed for agriculture, domestic and industrial uses, recreation, and other aquatic resources. The increasing demand for water and concerns over water quality have triggered a comprehensive review of the effects of forest management in Colorado on water quantity and quality. This paper summarizes the results of this review and identifies topics where additional information or research are needed.

Historic data indicate a gradual increase in forest cover and density, and a substantial reduction in the area burned by wildfires. For National Forest lands in the North Platte basin the decrease in average annual water yield has been estimated at 2.3 x $10^8$ $m^3$ (185,000 acre-feet) relative to 1860. The theoretical increase in water yields from systematic, sustained harvest on National Forest lands in the North Platte basin could be as much as 6 x $10^7$ $m^3$ (50-55,000 acre-feet) relative to current water yields. While these numbers are substantial in absolute terms, the predicted change in streamflow would be undetectable at existing gaging stations and substantially less in dry years. Current management activities on National Forests are generating only small increases in water yield, and these are probably negated by the overall trend of increasing forest density and cover.

The primary water quality concern related to forest management is the increasing risk of wildfires. High-severity wildfires like the 1996 Buffalo Creek fire can increase peak flows and sediment yields by several orders of magnitude. Of even greater concern to water suppliers are the potentially large increases in turbidity, manganese, and dissolved organic carbon. Efforts to reduce wildfire risk are relatively expensive, and must be directed to those areas with the greatest potential for adverse effects. More research is needed to better understand the processes and site characteristics that control post-fire changes in runoff and water quality, and to develop a GIS-based procedure for characterizing risks to water quality.

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