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# Linkages between forest soils and water quality and quantity

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## Abstract

The most sustainable and best quality fresh water sources in the world originate in forest ecosystems. The biological, chemical, and physical characteristics of forest soils are particularly well suited to delivering high quality water to streams, moderating stream hydrology, and providing diverse aquatic habitat. Forest soils feature litter layers and high organic contents, both of which contribute to an abundant and diverse micro- and macro-fauna. Root systems under forests are extensive and relatively deep compared to agricultural lands and grasslands. Together, these biological conditions create soils with high macroporosity, low bulk density, and highly saturated hydraulic conductivities and infiltration rates. Consequently, surface runoff is rare in forest environments, and most rainfall moves to streams by subsurface flow pathways where nutrient uptake, cycling, and contaminant sorption processes are rapid. Because of the dominance of subsurface flow processes, peak flows are moderated and baseflows are prolonged. Conversion of forests to row crops, pastures, or lawns almost always results in deterioration of water quality. In North America, the majority of municipalities ultimately rely on forested

quality. In North America, the majority of municipalities ultimately rely on forested watersheds to provide adequate quantities of high quality water for human use. This is particularly true in the western and eastern parts of the continent where human populations are large or growing rapidly. Forest soils provide the perfect conditions for creating high quality water supplies. This paper provides a historical perspective of the linkage between forest soils and water quantity and quality over the past century, and it also makes predictions about research directions in the area of forest soil and water quality linkages.



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## Keywords

Watershed management; Forest soils; Science development; Research needs

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