

# Effects of Typical Broad-leaved and Coniferous Forests on Water Quality in the Qinling Mountains, China

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## Abstract

Forests in the Qinling Mountains are an important source of fresh water for 34.68 million people in China. However, heavy metal pollution and acid rain have recently become common in this region. Forests can improve water quality; however, a large amount of the Qinling Mountains is covered by poor quality vegetation. This study investigated the effects of *Quercus aliena* var. *Acuteserrata* (Qa), *Pinus tabulaeformis* (Pt), *Pinus armandii* (Pa), and mixed broad-leaved (Mb) tree stands on water quality in this region. The results showed that the four stands increased the pH of slightly acidic rainfall; this effect was more pronounced in broad-leaved stands than in coniferous stands. As rainfall was converted to interflow, which is the most important type of runoff in natural forest, the average  $\text{SO}_4^{2-}$  concentrations in broad-leaved stands were higher in soil horizon A and lower in soil horizon B compared to coniferous stands. As rainfall passed through the trees, average  $\text{NO}_3^-$  concentrations increased whereas  $\text{NH}_4^+$  decreased. Compared to coniferous stands,  $\text{NO}_3^-$  and  $\text{NH}_4^+$  concentrations in soil horizon A interflow were higher in broad-leaved stands whereas  $\text{NH}_4^+$  concentrations were lower in soil horizon B. Average Cd and Pb concentrations decreased remarkably as rainfall flowed through the stands. Broad-leaved stands led to greater Cd reduction than coniferous stands. Furthermore, the Mb stand led to the greatest reduction in Pb concentration. These results will be useful for selecting the most appropriate tree species for afforestation in [water-source](app:ds:forest%20for%20water%20resource%20conservation) regions and in similar areas experiencing air pollution, specifically heavy metal pollution.

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