

Soil Quality is Fundamental to Ensuring Healthy Forests

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Government agencies, industrial landowners, and private landowners often strive to maintain soil quality after site management activities in order to maintain site productivity, hydrologic function, and ecosystem health. Soil disturbance resulting from timber harvesting, prescribed fire, or site preparation activities can cause declines, improvements, or have no effect on site productivity and hydrologic function. In many cases, detailed soil resource data can be used to determine the stress level and ecosystem health of stands and may be one method used to determine the risk of disease or insect outbreak. Currently, organic matter accumulations in many forests exceed historic levels. Fire suppression or fire exclusion has produced numerous overstocked stands. When this condition is combined with increased climatic variation, drought, and type conversion, these stands have a high risk for catastrophic wildfire. The resulting large, high-intensity, and high-severity fires could contribute to changes in soil quality and lead to outbreaks of insects and diseases in many ecosystems. Changes in ecosystem processes can also be associated with changes in overstory properties that alter forest stand resilience. For example, loss of western white pine to blister rust infection in the Northwestern United States has caused a type conversion to forest species that are not tolerant of root diseases, are not fire resistant, and sequester nutrients in the surface mineral soil and tree crown that can later be lost through logging or fire. These relationships, and others, can be used in conjunction with soil resource data bases to assess susceptibility to threats and to help develop management strategies to mitigate disturbances. Development of

monitoring strategies that use common methods that can be utilized by a variety of land management agencies and specialists is a key component for relating forest health to soil changes after fire or other land management activities.

Subsections found in Soil Quality is Fundamental to Ensuring Healthy Forests

- [Soil Quality](#) : Soil quality and function are interrelated concepts that represent the range of soil properties and their associated ecological processes.
- [Wildfire impacts](#) : Active fire suppression during the 20th century has increased OM volume on the soil surface in forest stands that historically had supported a regular fire-return interval (Oliver and others 1994).
- [Management Impacts](#) : The Healthy Forest Restoration Act of 2003 was designed to help alleviate the accumulation of OM by using partial cuts and prescribed fires to remove small-diameter trees and surface OM from many forest stands.
- [Acidic deposition and forest health](#) : The risks posed by atmospheric deposition to forest health are complex because of distinct regional patterns of deposition and temporal variations in air quality (McLaughlin and Percy 1999).
- [Monitoring](#) : Current soil monitoring efforts primarily address changes in soil quality through measures of compaction, pH, water infiltration, hydrologic function, water availability, and plant-available nutrients, but do not address ecological function of a site (van Bruggen and Semenov 2000).
- [Summary and management implications](#) : Solutions

to the current forest health problems are neither clear-cut nor easily managed (Tiedeman and others 2000).

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