

BIOSOLIDS RECYCLING

fact sheet



FORESTRY

Biosolids recycling in the forest encourages tree growth and increases timber yields, while enhancing understory vegetation to improve wildlife habitats.

Seeking Solutions

In the Pacific Northwest, forest soils are rocky and contain relatively few nutrients. Forest productivity is often limited by lack of nutrients or water. Pressure to preserve forests for wildlife and recreation, combined with population growth and the continuing demand for wood and paper products, challenges the ability to sustain working forests for timber production. Many of the area's old growth forests have been logged and are now managed for timber production for 40–60 year harvest cycles. To supply fiber to the pulp and paper industry and meet specialized consumer needs, diversification within the industry has introduced rapid-growing hybrid poplar plantations and Christmas tree plantations.



Benefits of Biosolids

Application of biosolids to forestland is recognized as an effective fertilization and soil conditioning mechanism. Biosolids enhance tree growth and the productivity of the entire forest ecosystem, including wildlife habitat. Biosolids may also help improve water quality of lakes and streams by increasing vegetation and enhancing the physical characteristics of forest soils, reducing erosion.

How It Works

- ***Soil improvement:*** The value of biosolids is in their ability to amend the soil, both by providing nutrients (especially nitrogen and phosphorus) and by improving soil characteristics. Forest soils have relatively small quantities of nutrients and organic matter, which can inhibit tree productivity. The fine particles and organic matter found in biosolids can quickly enhance soil moisture and nutrient-holding characteristics. In the long-term, biosolids provide a continual slow release of nutrients to the soil as the organic matter decomposes and site productivity may be permanently improved.
- ***Increased timber production:*** Most tree species grow faster when applied with biosolids; however, some respond dramatically while others show only a slight response. Douglas-fir, the Pacific Northwest's premier timber species, responds well, growing up to 75 percent faster when applied with biosolids.
- ***Secondary benefits:*** Within six months of a biosolids application to a conifer forest, understory plants are usually growing much more vigorously and displaying a deeper green color than before the application. This is not only visually pleasing, but can be of commercial value to people who harvest ferns

and other vegetation for floral arrangements. Increased understory vegetation due to biosolids fertilization is also typically higher in nutrients and can provide better food and cover for wildlife.

Research and Demonstration

Biosolids forest application research through the University of Washington College of Forest Resources and the University of British Columbia on application techniques, growth response and environmental effects has provided municipalities with the technical information required to embark on operational programs. Current research topics include stability of dewatered biosolids on steep slopes, improvement of water quality, soil quality improvement and reduction of erosion in forested watersheds.

What's Happening?

Today large and small biosolids producers alike maintain successful biosolids forestry recycling programs in the Pacific Northwest. If suitable land is available, effective and economical forestry programs can be developed. Applying biosolids to trees involves following proper management practices, including carefully selecting and designing sites, maintaining buffers from waterways and calculating appropriate nitrogen application rates.

- *Timber production:* Biosolids are used as a fertilizer in working forests throughout the Pacific Northwest in cooperation with both public and private forestland owners. *Nanaimo, Whistler (British Columbia); Arch Cape, Bend, Black Butte Ranches, Coos Bay, Lincoln City, Oak Ridge (Oregon); Bainbridge Island, Bremerton, Clallam Bay, Everett, Forks, King County, Long Beach, Oak Harbor, Ridgefield, Sequim, Stevens Pass, Tacoma, Washington Corrections Center, Woodland (Washington)*

- *Hybrid poplars:* The already rapid growth of hybrid poplars is enhanced when biosolids are applied to the soil, allowing tree harvests within seven to ten years of planting. *Greater Vancouver Regional District, Vernon (British Columbia); Woodburn (Oregon); Everett, King County (Washington)*

- *Mountains to Sound Greenway:* Environmental organizations have endorsed biosolids recycling as an important part of a public-private partnership to help maintain a flourishing green belt in Washington's Interstate-90 corridor. Forestland is being purchased to expand the state forest system and to recycle biosolids, generating more timber revenue for King County schools, colleges and government services. *King County (Washington)*

Wood Quality

The increased width of tree growth rings following a biosolids application has raised the question of how fertilization affects the strength characteristics of wood. While accelerated tree growth does reduce wood density by about 15 percent, studies have shown that this is similar to the density of wood grown on highly productive land or with commercial fertilizers and remains well within normal strength ranges for dimensional lumber.

Researchers believe that by combining biosolids applications with other forest management techniques (such as delayed thinning, pruning branches to increase clear wood, using application rates specially designed to achieve a specific growth response and timing applications during the growth cycle of the tree stand), wood quality can be enhanced.

