

UT *Biofuels Initiative*

Biomass Harvesting and Forest Stewardship: A Healthy Balance

The role of cutting low-value trees in proper forest management and the potential implications of biomass harvests for forests and landowners.

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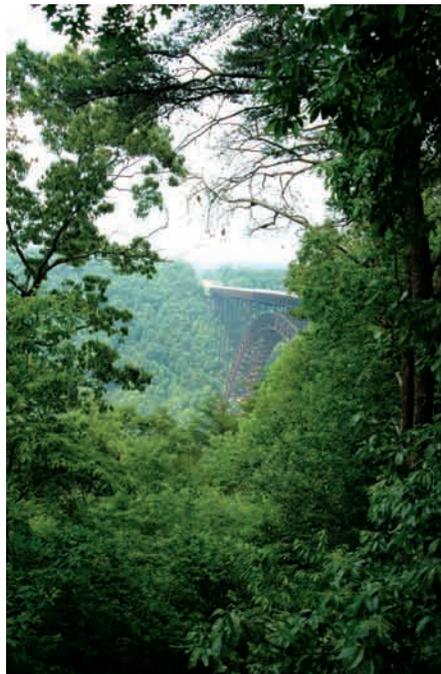
Tennessee forests: A diverse mixture

In a typical hardwood forest in Tennessee there is a mix of tree ages, sizes and species. These different trees have different value. Larger trees are usually higher value because they can be harvested and processed more efficiently, and usually they contain more high-quality wood. The wood products of certain species like walnut, cherry and oaks are of higher value than others, such as hackberry and soft maple, so these tree species are generally more valuable.

Forests in Tennessee contain many small, deformed or diseased trees, and trees of species that have little or no value in the current marketplace. Harvest of these trees for biomass and biofuels may be a way to provide value to Tennessee's forest landowners and to improve the health and productivity of the forest.

High-grading: Robbing from the future forest

In a typical harvest in Tennessee, only some of the trees in a forest stand are cut at any one time. Clear cutting – the harvest of all trees at once – is less common. Partial cutting of a stand can be



The forests of Tennessee are beautiful and diverse.

a component of good silvicultural practice, when the decision about which trees to cut is based on the objective of maximizing the long-term health and productivity of the forest.

It is a common misconception that all small trees will grow into large, high-value trees if given time. Many small trees are in fact as old as their neighbors, but for some

reason are failing to grow well. Likewise, some tree species are not well-suited to certain sites or will never produce valuable timber products. To encourage healthy forests in the future, and to increase the future value of the timber, these low-value trees should be removed.

A partial cutting in the context of proper silviculture should not be confused with high-grading. High-grading occurs when the best-quality, highest-value trees are harvested exclusively. High-grading provides a large immediate payoff for loggers and landowners. Unfortunately, after high-grading, small, low-quality trees and lower-value tree species are left behind. Forests made up of these lower-value stems are not as healthy and do not increase in timber value like stands that are not high-graded.

One reason that high-grading occurs is that there are no local markets for the small, low-value tree stems. Loggers then cannot justify the harvest of those trees, even though it could improve the long-term timber value of the stand. Thus, increased biomass utilization could encourage proper forest management by providing a financial incentive to remove low-quality trees from forest stands.

The role of biomass in proper forest management

When wood is used for biomass products and energy, the species, size and form of the tree stems may not be important factors. Any wood can be burned for energy. All wood species contain the fundamental polymer components – lignin and carbohydrates – that are raw materials for chemical processing. Thus, factors, such as the cost and consistency of supply, can be more important considerations than timber quality when marketing woody biomass.

If markets for biomass are available, loggers and landowners may then be able to justify the cost of cutting and hauling the small and deformed trees, the trees of underutilized species and possibly even the limbs and tops from harvested trees that would otherwise be left in the forest. These items are not suitable for the production of traditional wood products such as veneer and lumber, but if they are left in the forest, they can reduce the long-term productivity and health of the forest. Thus, a biomass harvest can be a valuable addition to a traditional timber harvest by providing a market for the less valuable products.

Will biomass harvests deplete our forests?

With increasing interest in using woody biomass for energy and products, one should consider what increased tree harvests might mean for the forests and people who depend on forest resources. In the past, there were proposals to build new chip mills in Tennessee. These mills would have chipped low-value hardwood logs to produce raw material for pulp and paper making. This in an example of a biomass harvest, although the product in this case would have been paper, not energy. The possible impact of these mills on the forests and forest industry in Tennessee stimulated a



Woody biomass that is used for fuel, fiber or chemicals is usually processed as small chips or particles. Log quality and tree species are less important for biomass than for solid-wood products such as lumber.

number of concerns: Would all the trees in the area be cut to feed the new mills? Would existing sawmills be starved of wood?

These questions cannot be answered directly because the chip mills were not built in Tennessee. However, North Carolina provides an interesting case study. The number of chip mills in North Carolina expanded from two to 18 in the 1980s and 1990s. Despite this dramatic increase, a recent study suggests that the effects of these chip mills were small overall. The new markets created by the chip mills tended to increase pulpwood (small or low-value tree stems that are not suitable for sawmilling) cutting levels within existing harvests, or to increase harvesting of small stands. Small, private landowners in particular received modestly increased

payments from the increased harvesting. However, the presence of chip mills did *not* lead to clearcutting of valuable sawtimber, nor did it result in significant changes in forest management practices.

There is good reason that valuable sawtimber have not been indiscriminately converted into pulp chips in North Carolina. Sawlogs have a much higher value than pulpwood and a logger's livelihood depends on the ability to cut trees to produce the highest-value products. The same will be true for biomass harvests in the future – it will always make economic sense for the highest-quality wood to go to the highest-value end use (i.e., logs to the sawmill) and the low-quality material (biomass) for the *relatively* low-value end-use (e.g., energy).

Biomass harvests and water quality

Another concern that is frequently cited in discussions of timber harvesting is water quality. However, water quality reports by the Tennessee Department of Environment and Conservation substantiate that timber harvesting is not a significant threat to water quality where “Best Management Practices” are used.¹ A significant emphasis of Tennessee’s Master Logger educational program is to promote soil and water protection. Ongoing programs protect Tennessee’s water by helping landowners and loggers conduct thoughtful operations.

¹2006 305(b) Report The Status of Water Quality in Tennessee. Available for download at <http://www.tennessee.gov/environment/wpc/publications/2006305b.pdf>. Accessed July 17, 2007

A win-win for wood

Forests in many areas of the United States are growing much more quickly than they are being cut. In Tennessee, almost twice as much wood grows each year as is harvested. Even when natural tree mortality and forest fires are taken into account, growth exceeds removals by more than 35 percent per year.² However, some of this growth consists of small or deformed trees that will never grow to be large, valuable sawtimber. The increased harvest of these poor quality trees for bioenergy and bioproducts may be a way to provide useful markets for forest landowners and to improve the health of our forests.

²From Tennessee Department of Agriculture *Forest Facts*. Available for download at <http://www.state.tn.us/agriculture/forestry/tdfff.html>. Accessed July 17, 2007

Landowners can benefit from biomass markets when a more complete harvest of their stands increases revenues. At the same time, better forest management, including the removal of diseased trees or undesirable tree species, can improve the long-term productivity and health of the forest stands.

If the biomass industry is successful, there could be high demand for biomass materials, including wood. This could cause increased competition for biomass resources, which could further increase the prices paid to loggers and landowners for materials that currently have little or no value.



High-quality sawlogs are only one component of Tennessee’s forests. Lower-grade logs can be used for biomass.



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