Waste Not, Want Not:
Using Urban Wood-Waste to Benefit Communities

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According to the 2010 U.S. Census, close to 80 percent of the U.S. population lives in metropolitan areas, and Mississippi's population is 49 percent urban, one of the smallest urban populations in the country. As urban populations and urban areas expand, the urban forest increases, too, and the U.S. urban area is expected to increase more than 8 percent by 2050,[1] or an addition roughly the size of Montana.[2] Urban places currently make up 35.1 percent or 20.9 million acres (3.8 billion trees) of the U.S. land area.[2]

So it's a good thing that urban trees provide $2.4 trillion worth of benefits, including:

- $2 billion annually in reduced energy costs.
- $3.8 billion in air pollution removal value.
- $14.3 billion in stored carbon.[1]In addition, research demonstrates that urban trees contribute to increased real estate values and improved health for urban residents.[1]

However, these benefits are counterbalanced by 14.8 million metric tons of annual wood residue (wood-waste), as urban trees are trimmed, pruned, or removed for various reasons.[3] These research findings support the importance of sustainably managing the natural resources in our urban areas, particularly urban water, vegetation, and soils.

The urban forest is often overlooked when it comes to wood-based products. However, interest in the use of urban wood-waste is growing as urban areas expand, landfills become full, and catastrophic storms or pest outbreaks require the removal of millions of damaged trees. This publication will examine several successful models for use of urban wood as well as challenges involved in sustainably using urban wood-waste.

Wisconsin Urban Wood

While there are many examples, cities in Wisconsin are exceptional in their efforts to use wood from local urban trees. Through Wisconsin Urban Wood (WUW), a network of independent businesses, arborists identify eligible sawlogs among trees destined for removal. This includes 22 million ash trees threatened or killed by the emerald ash borer. Local custom mill houses then process the logs and sell the lumber or turn it into enduring goods (Figures 1 and 2). In 2016, WUW experimented with selling wood using an auction website to increase profits.

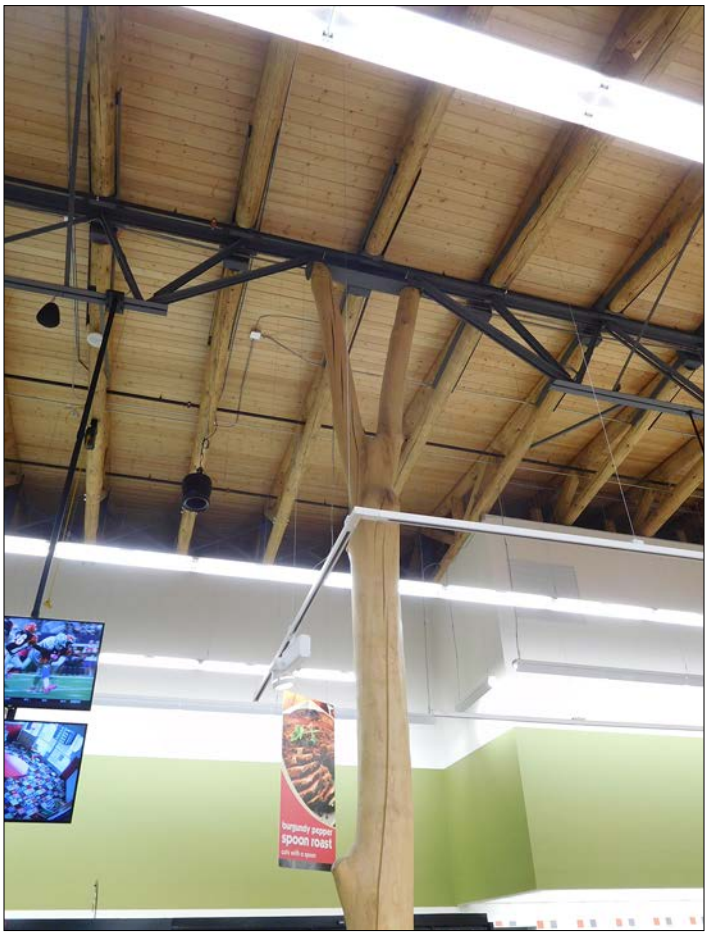

Figure 1. Festival Foods in Madison, Wisconsin. Beams are recycled red pine, and columns are green ash harvested from city parks. The value of the column is in the character of the wood and the structure: in this case, the fork.

Generally, high-quality trees greater than 12 inches in diameter at breast height can be used for value-added products. WUW members create many high-value end products, including furniture, paneling, flooring, windows, doors, moldings and trim, and art, which are sold to offices and stores. In other cases, the wood or wood trimmings are chipped and used as bedding for playgrounds or animals or used in the county landfill to create bioenergy. The landfill's costs are recovered through tipping fees and the sale of energy to the grid. Wood produces about 9,000 Btu/lb and can be converted to liquid, gas, or charcoal fuels.[4]

Figure 2. Slabs of urban wood displayed at a small mill and furniture manufacturer in Madison, Wisconsin. Species include honey locust, Siberian elm, white oak, red mulberry, and Northern catalpa, among others.

Baltimore Wood Project

The Baltimore Wood Project is another example of the use of urban wood-waste. Working with the U.S. Forest Service, this project brings together city government, nonprofit organizations, and community leaders to capture wood-waste streams from removal of trees and tree parts, as well as salvaged wood from vacant or remodeled houses. Vacant homes are an important source for salvaged wood, as over 4,000 condemned houses are slated for demolition in Baltimore's inner-city neighborhoods.

Like the Wisconsin cities, project leaders first conducted a feasibility assessment and inventory. Wood-waste is inspected and hand-sorted at a landfill facility. Wood is separated by quality and marked according to species or grade. A log scanner detects any metal debris in the wood. Finally, the wood is repurposed to local users. As the green building and engineered-wood sectors continue to grow, so will the demand for upcycled urban-wood products.

Advanced Wood Combustion

A third example focuses on advanced wood combustion (AWC), particularly in states in the Upper Midwest and Northeast, which contain abundant forests and are dependent on heating oil. AWC uses urban waste to create community-based renewable energy (heat, cooling, and power) for local public facilities, hospitals, prisons, and industrial facilities. According to one study, these small systems—often around 0.1 to 10 MW (thermal)—emit remarkably low quantities of air pollutants, have high thermal efficiencies, and reduce the need for imported oil.[4]

AWC contributes to job creation in the energy sector as well as in urban tree removal. Forestry sector jobs are also added because urban wood-waste is supplemented with material from local, sustainably grown forests.

AWC has been successfully implemented in places like Vermont, where 20 percent of public schools are wood-heated, and in Minnesota, where a refurbished coal plant generates 28.5 MW from around 280,000 tons of wood waste from St. Paul each year. In 2003, President Bush called the Minnesota operation "a model of energy efficiency."[5]

Challenges

There are, however, several major challenges related to using urban wood-waste. Wood quality can be a problem, because many urban trees grow in open settings, resulting in shorter trunks and more branches than those of their

forest-grown counterparts. Urban wood may also contain metal debris. Many communities across the nation have addressed this concern by employing lumber grading inspectors and scanning technology, as well as sorting and marketing urban wood for smaller, high-value projects or for renewable energy. These examples demonstrate the value of urban wood and that it should be understood and evaluated differently from traditional wood products.

Consistent supply also can be challenging, unless a large pest outbreak or storm event occurs. Engineering supply and transportation efficiencies may provide some solutions to the supply problem; however, urban supply markets are limited by species diversity and often include species not conventionally valued in traditional timber markets. Further, adequate urban tree inventories, feasibility studies, and use plans are lacking and often too complex and expensive for many municipalities to undertake without external assistance. Successful urban wood-waste systems must involve cooperation among public and private partners at various levels.

Despite these challenges, interest in the use of urban wood-waste will continue to increase as urban areas expand into rural forestlands. Given the costs of urban wood as a significant portion of the solid waste stream, the waste from urban tree removal must become a benefit to society instead of a resource sink.

No one system is a complete solution to the problem of urban wood-waste; the most effective approach is probably a combination of waste management strategies. Regardless, there is no doubt that urban trees should be used to their best and highest value instead of wasted. Although resources vary across Mississippi communities, leadership, public support, and financial pressure are key to sustainable and beneficial use of urban wood-waste.

For More Information

Urban Wood Exchange
http://www.urbanwoodexchange.org/

North Carolina Forest Service
http://ncforestservice.gov/Urban/urban_wood_resources.htm

Baltimore Wood Project
http://www.baltimorewoodproject.org/

Wisconsin Urban Wood
http://wisconsinurbanwood.org/

Minnesota Wood Energy
http://www.dnr.state.mn.us/forestry/biomass/swet.html

References

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[2]Nowak, D. J., Walton, J. T. (2005). Projected urban growth and its estimated impact on the U.S. forest resource (2000–2050). *Journal of Forestry*, 103(8):383–389.

[3]Solid Waste Association of North America. (2002). Successful approaches to recycling urban wood waste. Gen. Tech. Rep. PL.GTR.133. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 20 p.

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[5]Gordon, D. (2008, Jan. 2). Burning wood and building an empire. *Twin Cities Daily Planet.* Retrieved from http://www.tcdailyplanet.net/district-energy-empire-built-wood/

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