Exploring Opportunities for Woody Biomass Utilization in Coconino County, Arizona

Executive Summary

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Forests in the southwestern United States face a number of critical issues, many of which stem from European settlement and intervention. Ecosystems that once thrived with natural fire regimes have become choked by overgrowth and encroaching development. Historic fires in this region, caused by lightning and indigenous people, cleared underbrush, created habitat, increased soil fertility, and allowed large, old-growth trees to thrive. Without fire, forests have become overcrowded with small-diameter trees and brush, also known as woody biomass, which often results in increased rates of pest infestation and disease, lowered water tables, and fire-hazardous conditions. These issues are compounded in heavily populated and arid regions such as Arizona, where prolonged drought and increases in the wildland-urban interface are the new normal.

In order to reduce the risk of catastrophic wildfire and improve the natural and human capital derived from forested ecosystems, the removal of woody biomass has become a primary focus of restoration efforts in the Southwest. However, while there are a number of ongoing and planned restoration projects in the region, several obstacles have historically prevented their success: the extensiveness of federally managed land, the low value of standing timber, the unprofitability of restoration logging, the absence of sawmills, and the lack of biomass processing infrastructure. After conducting an extensive literature review and speaking with a number of forest stakeholders in the region, it was determined that the creation of biomass utilization enterprises could provide the necessary investment and infrastructure to increase the pace of much needed ecological restoration in Coconino County.

The ultimate goal of this project was to identify small to medium scale enterprises (SMEs) focused on the utilization of woody biomass generated from forest restoration projects, to be presented to forest stakeholders in Coconino County. With regional barriers and opportunities in mind, four enterprises were identified, researched, and evaluated: biochar, compost, wood plastic composites, and mushroom cultivation. In order to analyze to what degree each enterprise could embody core sustainability principles, and communicate those findings in a visual interpretation,

an adaptation of Dr. Arnim Wiek and Dr. George Basille's "Transformational Sustainable Enterprise (TSE) Framework" was used to create the final project portfolio.

Through this project's research, it was determined that by purchasing unmerchantable biomass from restoration loggers, enterprises are not only capable of diminishing the negative impacts associated with slash pile burning, but can transform waste materials into high-value products, provide local jobs, and form collaborative industries. It also became clear that the research was attempting to bridge the gap between forestry, sustainability, and business economics – three paths which rarely cross when developing private sector solutions to public sector problems. While there is ongoing research concerning innovative uses of woody biomass throughout the world, sparse information exists regarding how SMEs can support forest restoration projects by purchasing residual material from loggers, and particularly how they can do so by organizing in alternative business structures that benefit the local economy, environment, and community.

This project's aim was not to endorse certain behaviors or provide concrete recommendations, but rather to add new insights to an emerging body of research regarding how biomass can be utilized in innovative and sustainable ways. The culmination of this project resulted in a portfolio of enterprise opportunities suited to Coconino County, and was presented to stakeholders in the region and across the western United States, where practitioners face similar issues. At the least, this research and the interest garnered by it in Coconino County represents the growing necessity for interdisciplinary collaboration to achieve forest restoration goals. Although ideally, this project will spark communication and innovation among organizations and agencies in northern Arizona that feel trapped by the barriers to restoration, and provide concrete evidence of viable biomass utilization industries.

There is no simple or easy solution to repair the degraded forests of the American Southwest. However, dedicated professionals and researchers are working diligently to find the answers. Due to the high level of interest generated by this project in northern Arizona, there is definite potential to continue this line of research for the foreseeable future. While this project attempted to analyze surface-level economic aspects of biomass enterprises in Coconino County, a more detailed examination of potential costs, markets, or life cycle analyses would be beneficial for environmental entrepreneurs and practitioners throughout the region.