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## Forest Sustainability: Bioenergy Breaks and Barriers

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While providing some opportunities, forest sustainability framework may hinder bioenergy development.

By Robert W. Gray and Francisco Seijo | May 06, 2013

Managing forests sustainably is a noble idea and can result in a number of very positive social, economic and environmental outcomes. The sustainable forest management (SFM) paradigm as it is being currently developed and implemented by policy networks in Europe and North America, however, may not be the best guide for action everywhere.

Originating in the 1990s, the SFM concept was part of the greater effort to develop a sustainable economic development framework intended to guide policymaking efforts through the global environmental challenges of the 21st century. The Ministerial Conference on the Protection of Forests in Europe developed the following definition for SFM: “The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.” Other definitions are available, with the central premise in all emphasizing three key areas of sustainability to be harmonized: the environment, society and the economy.

Based on these principles, a series of criteria and indicators of sustainability have been developed by a number of expert third-party organizations that exert supervisory control over forest product commodity markets. For a fee, organizations such as the Forest Stewardship Council and the Sustainable Forest Initiative, among others, audit forest operation plans for adherence to the criteria of a particular certification brand. For the most part, these groups have been successful in using public pressure—by appealing to “green” or socially and ethically responsible consumer habits—to compel forest products manufacturers to adopt a certification system. To date, sustainability certification has focused on traditional products such as dimension lumber, pulp and paper. More recently, the focus has shifted to woody bioenergy products.

### Restoration Through Bioenergy

The emerging bioenergy sector provides one of the few remaining economic opportunities for restoring resilience to hundreds of millions of hectares of forest in western North America, but the application of SFM criteria may stand in the way. Current landscape issues cannot be addressed with an SFM model based on the nondeclining, even flow of biomass.

The current Western forest structure is the result of past management strategies. Beginning in the mid- to late-1800s, public forest administrations attempted to prevent and exclude all fire in ecosystems that had evolved for thousands of years under the influence of this crucial disturbance. The result has been a dramatic increase in forest density, mortality and, in some cases, a wholesale shift in species composition and landscape structure and function.

These ecological transformations could conceivably be tolerated by contemporary societies, and even welcomed from a business perspective, if there were no detrimental consequences. Society, the environment and the economy are experiencing quite the opposite, however. Scientists tell us wildfires are currently behaving with an intensity and severity unprecedented in the past 1,000 years. In the past decade in the U.S., wildfires have burned an average of 2.5 million hectares per year (6 million acres) with annual suppression costs running into the billions of dollars. With a population of barely 4 million people, British Columbia alone experienced wildfire suppression costs exceeding \$2 billion in the first decade of this century. Environmental economists suggest the true cost of wildfires can be two to 32 times greater than suppression cost when all factors are considered, including human lives and health, property loss and damage, damage to watersheds and domestic water quality. Climate change researchers also suggest that fire seasons are getting longer on average, which is likely to increase the annual burned area in western North America.

Restoring resilience to fire-suppressed ecosystems is contingent on removing the inherent structural threat—the unnatural accumulation of woody fuels that is driving current trends in fire intensity and severity. Decades of fire exclusion have resulted in forests choked with high volumes of low-value wood.

From an economic perspective, these dense stands of ponderosa pine, Douglas-fir, juniper and other conifer species contain small quantities of more valuable round wood that can be milled into dimension lumber. Ecologically speaking though, many of the larger-diameter, more economically valuable trees need to be left standing due to their fire-tolerance. Thus, the traditional forest products industry has little economic incentive to utilize these resources.

There is a vast potential in western North America to mobilize the emerging bioenergy sector and the new market opportunities as an outlet for these large volumes of low-value material threatening western forests and

communities. The bioenergy industry can profitably exploit these resources, manufacturing degraded forest materials into wood pellets, biocoal or renewable diesel. The economics of bioenergy utilization can be difficult, however, because volumes are often low, harvest costs are high, transportation to receiving industries can be costly due to distance and fuel prices, and the prices paid for the raw material (chips) or finished bioenergy product are relatively low.

The best available business models combine the harvest of higher-value products, such as sawtimber, with the removal of biomass. Two of the largest contributors to project feasibility are the sale price of biomass products and market availability. Current SFM certification schemes, however, do not provide the needed flexibility for those business models to access the global bioenergy markets. Trade-offs may need to be made among the three utilities that are to be maximized simultaneously: the environmental, social and economic.

### Paradoxes in Sustainability

In Western forests, the extremely large volumes of biomass need to be removed quickly, if we are to truly reduce the risks and hazards of wildfire in the short- and medium-term. In the long-term, this would result in resilient and sustainable forest ecosystems with significantly lower tree density. Paradoxically, this positive environmental outcome would not result in sustainable employment (social effects) or business activity (economic effects).

The initial thrust to treat large areas of the landscape would require large-scale employment in biomass harvest and manufacture but, eventually, those job and business opportunities would be dramatically reduced. The initial landscape intervention phase could take up to a decade or more, but unfortunately, after this initial aggressive forest treatment stage, the employment and business activities associated with low-hazard maintenance would be greatly diminished. This situation thus resembles the “boom and bust” economic model embraced by extractive mining activity. A similar business model may be necessary to solve the ecological dilemma in Western forests, though it may contradict some of the principles of sustainable forest management and may require reformulation.

For the current SFM paradigm approach to work in this situation, we would be required to treat the landscape gradually. A slow implementation would harmonize employment outcomes (the social component) with the harvest of the annual increment of volume growth (the economic component) in order to achieve the desired environmental outcome. This model works well in productive ecosystems that experience small-scale disturbances, but not in the low-productivity Western ecosystems where disturbances are tending towards large-scale fire and pest events and where climate change modeling suggests that forest productivity will continue to decline dramatically.

Treating only the annual increment of volume growth, in an effort to provide sustainable employment and business profitability, would only lead to a continuation of the current, ecologically detrimental vicious circle of forest health decline and mega fires. In the end, the resulting landscape would be incapable of fulfilling the essential environment, social and economic functions.

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