Incorporating Payments for Ecosystem Services into Western Forest Management

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The value of forests to society cannot be overstated. In addition to providing a source of timber, food and fuel, we depend on forests for ecological services like air and water purification, nutrient cycling, and climate regulation, as well as a source of cultural and social benefits. However, for over a century, forest economists have focused almost exclusively on commercial timber as the primary source of value. The more recent development of markets for ecosystem services and an improved understanding of the complex linkages between forest management and ecosystem services have enabled the formal inclusion of non-timber values into standard economic models. Using this broader lens, forest economics provides fundamental insight into how ecosystems and commercial timber can be jointly managed in ways that positively impacts forests and communities.

People have long recognized the value of the natural world to human society, but only in recent decades has the term "ecosystem services" been used to describe these benefits.

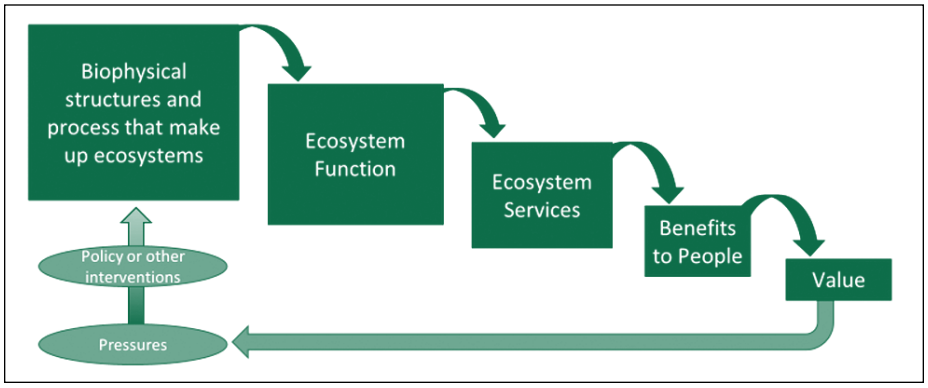

FIGURE ADAPTED FROM HAINES-YOUNG AND POTSCHIN, 2010

Figure 1. The biophysical structures and process that make up forest ecosystems support functions, like slowing the movement of water off a hillside. Those functions in turn provide goods and services, like flood protection, and those services benefit people by reducing the risk of a damaging flood. People in turn value those benefits and may be willing to pay for those services directly or exert pressure on the ecosystem to increase or maintain the flow of services, i.e. via change in land management. In some cases, policy or other interventions may be necessary to protect ecosystems' flow of benefits to people. Because the benefits people receive flow from ecosystems, many payments for ecosystem services go toward the protection and improvement of an ecosystem (e.g., conservation easements) which sometimes have more easily defined property rights than the actual ecosystem services, e.g., aesthetic and spiritual value or protection against unpredictable events like floods.

Gretchen Daily's 1997 book, *Natures Services* is credited for elevating ecosystem services to the global stage and setting the groundwork for the adoption of the term in the 2005 United Nations commissioned report, the *Millennium Ecosystem Assessment (MEA)*. The MEA is the most widely used reference for ecosystem services which are defined as, "the benefits people obtain from ecosystems." An underlying assumption of ecosystem services is that the benefits people value and receive from nature flow from healthy, intact ecosystems.

A critical element of managing forests for environmental and social benefits in addition to timber is the monetization of ecosystem service values. Such monetization has come to be known as "Payments for Ecosystem Services" (PES). PES provide financial returns for forest management activities that produce quantifiable ecosystem service values. In the US, voluntary and regulatory compliance markets for ecosystem services exist with demand from both public and private entities. The largest ecosystem service markets in the US are wetland mitigation banking credits, carbon offsets, conservation easements, hunting leases, and water quality/quantity credits.

In the Pacific Northwest, there are many examples of different forest owners and stakeholders benefiting from PES.

Carbon Offset Credits. The City of

Table 1. The total annual market for ecosystem service in the US likely exceeds $3.5 billion. These services are an increasingly important source of income for forest owners and their significance is likely to increase with growing demand for the diverse ecosystem services forests provide.

PES vehicle	Examples	Estimated Annual US Market Size
Tradable Permits	Carbon offsets	$133 million[1]
	Wetland mitigation banking	$3.5 billion[2]
	Water quality trading	$93 million[3]
Access Leases	Hunting leases	$400 million[4]
Easements	Conservation easements	235,000 acres[5]

SOURCES: [1]2017 TOTAL INCLUDES $93 MILLION COMPLIANCE MARKET AND $40 MILLION VOLUNTARY MARKET (CLIMATE TRUST AND CA ARB); [2]2016 TOTAL (FOREST TRENDS); [3]2015 TOTAL (FOREST TRENDS); [4]2005 TOTAL (MERCER ET AL. 2011); [5]TOTAL AREA IN 2018 (NATIONAL CONSERVATION EASEMENT DATABASE).

Astoria, Oregon, generated $1.8 million in net revenue for selling carbon credits from its forest within the municipal watershed. The credits were sold in the voluntary market in 2015 to The Climate Trust and the city is on track to raising an additional $1 million worth of carbon credits in 2020. The sale of carbon credits provided the city with revenue while meeting their watershed protection goals. In the California compliance market, more than 14 million forest carbon offset credits have been issued to the Confederated Tribes of the Colville Reservation on their Washington State lands. Green Diamond, a private timberland management company, has also sold forest carbon offset credits in the California compliance market through improved forest management on 600,000 acres in southern Oregon.

Hunting Leases. Recreational ecosystem services like hunting can provide forest owners a source of revenue without impacting commercial timber value. Timberland owners have been selling hunting leases for decades in the Eastern and Southern US and now the trend is growing in the Pacific Northwest. According to the company website, Weyerhaeuser is selling recreational access permits for many of its commercial timber properties in Oregon and Washington. Non-motorized access is $75-$100 per annual permit while motorized access that includes keys to locked gates ranges from $225-$395 for an annual permit. With potentially thousands of visitors per year to some of their properties, permits have the potential to generate millions in annual revenue for the company. The company is also offering exclusive leases to some parcels in Oregon for about $100 per acre per year.

Conservation. Working forest conservation easements restrict development rights and ensure sustainable forest practices, often with minimal impact on management. Easements may be purchased by a public agency, a private individual, or a nonprofit organization.

The Nature Conservancy alone has purchased land or easements on millions of acres across the Western US. Competitive grant funding from the US Forest Service Community Forests and the Forest Legacy programs has been awarded for fee simple acquisitions of timberland and easements from private timberland owners in support of working forests that prioritize ecosystem services in addition to commercial timber. For example, in 2018, the Trust for Public Land and Washington State's Department of Natural Resources purchased a 7,391-acre conservation easement on the Olympic Peninsula from Green Diamond to protect water quality, wildlife habitat, and recreation opportunities alongside continued commercial timber production. The conservation easement was purchased for $6.6 million with funding from the USDA Forest Service Forest Legacy Program. Conservation easement sales can be an important source of revenue for forestland owners and provide a mechanism for other stakeholders to secure ecosystem service values.

Incorporating ecosystem service values into forest management decisions may improve financial, environmental, and community outcomes, as the examples above demonstrate. However, ecosystem service markets are not a panacea. Unlike pure private goods, ecosystem services have public good qualities and are, to varying degrees, non-excludable (it is costly or impossible to exclude others from consuming the good) and non-rivalrous (when one person consumes the good, there is not less for others to consume), adding complexity to markets. Further, pricing some ecosystem services (e.g., spiritual value of sacred forests) is infeasible or may be undesirable.

Another challenge is the potentially high social and economic cost of establishing ecosystem service markets. For example, establishing regulatory carbon markets can be politically controversial, as we saw in Oregon with HB 2020, and comes with a regulatory burden—however, there is an expansive literature on the ability of market-based programs to achieve environmental targets more efficiently than through government regulation.

Finally, participation in ecosystem service markets may be cost-prohibitive for small landowners.

Despite these challenges, payments for ecosystem services through voluntary and compliance markets provide forest owners with an additional source of revenue, increasing the economic value of the forest and incentivizing the protection of environmental and social benefits. In the future, society's demand for ecosystem services from forests is likely to increase and diversify. Thus, as ecosystem service markets continue to develop and demand for these services grows, their importance as a revenue source is likely to increase. While the provision of ecosystem services may not be the primary objective for many forest owners, they do have the potential to add value to timberland assets, improve the social license to operate, and ultimately lead to better environmental outcomes across the landscape. ◆

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