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When Sound Science Is Not Enough

Regulating the Blues

In the Blue Mountains of the inland West, early foresters attempted to use the best science of the day to transform old-growth into regulated, productive forests. Managers of the 1920s thought that maximizing outputs from public forests would avert a timber famine. In the effort to reshape the forests into scientifically efficient producers of timber, old-growth had to be liquidated quickly. But the plan backfired, helping to create a forest health crisis across the West as well as a policy nightmare. Understanding the motives of those early foresters and the forest history of the region can help those who seek effective strategies for restoration today.

By Nancy Langston

The Forest Service often has been attacked for its management of the national forests. As policy analyst Robert Nelson (1998) argued in a recent issue of the *Journal of Forestry*, "Assertions that there is a 'science' of ecosystems are really an effort to preserve the claims of 'scientific management' despite the manifest failures of forestry." The real issue in forest management, Nelson argues, is a conflict over basic values masked in the language of science. Similarly, when the independent Committee of Scientists headed by Norman Johnson reported to Congress that sustainability and ecological integrity, not timber production, should guide management of national forests, critics accused committee members of cloaking their "conservation agenda in scientific garb" (Mann and Plummer 1999).

Current debates over the roles of science and values in the management of national forests cannot be resolved without understanding the history. The conflicts are not new. Scientific pronouncements about correct forest management have long reflected societal values as well as economic factors (Hirt 1994). Since its inception, however, the Forest Service has tried to use scientific expertise to sidestep difficult debates about values. Yet this recognition does not mean that scientific management is a failure. Adaptive ecosystem management offers a way to

Above: **Clearwater Ranger Station, 1913, in what is now the Umatilla National Forest.**

Courtesy of USDA Forest Service

Fighting a ground fire among ponderosa pine in the Blue Mountains, circa 1910.

ground policy in science without avoiding critical conflicts in values.

The Blue Mountains

My case study is the Blue Mountains of eastern Oregon, where for nearly a century foresters attempted to use the best research of the day to transform old-growth forests into regulated, scientific forests. Forest managers sought to maximize outputs from public forests, hoping to minimize conflicts between different users who wanted access to forest resources. But their policies backfired and helped create instead a forest health crisis across the West (Langston 1995).

When Euro-Americans first came to the Blue Mountains of eastern Oregon and Washington in the early 19th century, they found a land of open forests with ponderosa pines 5 feet in diameter. These forests were so promising that people thought they had stumbled into paradise (Langston 1995). But after a century, that paradise was irrevocably lost. The stately ponderosa pines were gone, and in their place were thickets of fir and lodgepole. The ponderosa pines had resisted most insect attacks, but the trees that replaced them were the favored hosts for defoliating insects, such as spruce budworm and Douglas-fir tussock moth. As the firs invaded, insect epidemics swept the dry Western forests. By 1991, on the 5.5 million acres of Forest Service lands in the Blue Mountains, insects had attacked half the stands, and in some stands nearly 70 percent of the trees were infested (Gast 1991).

Even worse, in the view of foresters and many residents, was the threat of catastrophic fires. Although light fires had burned through the open pines every 10 years or so, few had become crown fires. But as firs succumbed to insect damage, far more fuel became available to sustain major fires. By the early 1990s, one catastrophic fire after another had swept the inland West, until it seemed as if the forests might entirely go up in smoke.

In 1991 the Forest Service acknowledged that its own past management had helped create a crisis in forest health and that those practices needed to change (Gast 1991). Two hypotheses emerged to explain the origins of the crisis. Many environmentalists said the problem was too much management: The Forest Service had worked hand in hand with industry to cut trees as fast as possible, devastating the forests. Excessive harvests, soil compaction, high-grading that removed ponderosa pines and left only firs behind, combined with even-aged management—all this led to a simplified ecosystem that became increasingly susceptible to epidemics.

Many foresters argued just the opposite. The forests deteriorated, they said, because the Forest Service had bowed to the demands of sentimental preservationists and refused to manage intensively enough to save the forest from its natural enemies—fire, insects, and disease. Because ponderosa pine is shade intolerant, they argued, clearcutting, even-aged harvests, and intensive management were necessary to prevent fir stands from replacing pine stands. In their view, the best way to make forests healthy was to manage them as intensely as possible (Langston 1995).

Those two perspectives on the history of forest health problems obviously lead to radically different management prescriptions. Neither, however, tells the whole truth. Understanding what early federal foresters did in the Blue Mountains, and why they did it, is critical for devising restoration strategies.

Old-Growth Policies

At the turn of the 20th century, many Americans were in a furor over land management. Disposal of the vast tracts of western land was often a corrupt process, and to many Americans, the federal government seemed most

corrupt when it came to managing land. The new forest scientists promised that science could end political corruption. By turning to the clear, calm, seemingly universal rules of science, foresters would stand above contentious politics. With the interests of America and American forests at heart, they considered themselves beyond criticism. They alone could serve the public good, they believed, because efficiency rather than short-term profit was their goal (Hays 1959).

In its eagerness to ensure that there would be forests for the future, the Forest Service made a critical decision: It determined to liquidate old-growth ponderosa pine as rapidly as possible, to stimulate growth of young forests.

At the turn of the century, foresters defined old-growth forests (also called overdecadent or overmature forests) as those whose annual growth did not exceed annual decay. In contrast, regulated forests were young and still growing quickly, adding more volume in a year than they lost to death and decay. More important, they were growing in an orderly fashion, so that each year the exact same number of trees came available for harvest—ideally, for eternity (Parry et al. 1983).

Scientific forestry, later known as sustained-yield forestry, required regulated forests so that the annual net growth could be harvested each year. In a regulated forest, the reasoning went, loggers could harvest the net annual growth forever without depleting the growing stock. The economic analogy is obvious: The harvest was equal to the interest; the growing stock was equal to capital; and just as no sensible businessman would want to invest in a bank that paid no interest, no sensible forester wanted an old-growth forest that produced no net growth.

If the United States was running out of timber, the best way to meet future demands was to grow more timber. Since, according to Forest Service surveys in the early 1900s, more than 70 percent of western forests were old-growth stands, western forests appeared to be losing as much wood to death and decay as they were gaining from growth. Many foresters believed that to avert a timber famine, old-growth forests needed to be liquidated and replaced by regulated forests. The best way to free up the land for growing, regulated production was by promoting sales of old-growth.

In 1911 C.S. Judd, assistant forester for the Northwest region, said exactly that to the incoming class of forestry students at the University of Washington. A timber famine was imminent unless the Forest Service acted quickly to grow trees faster. As Judd put it, "the good of the forest…demands that the ripe timber on the National Forests and above all, the dead, defective, and diseased timber, be removed." The way to accomplish this was to "enter more actively into the timber sale business" and promote sales. This would get rid of the old-growth, freeing up land to "start new crops of timber for a future supply" (Judd 1911).

As Frederick Ames, another Blues forester (and eventually chief of silviculture for the Forest Service) said at a supervisors' meeting in 1906, "From no point of view can we make any mistake in cutting timber of this [old-growth] class. The more sales we make the better" (Ames 1910). The unregulated, old-growth forest was something to be altered as quickly as possible for moral, not just economic, reasons—to alleviate what one forester termed "the idleness of the great areas of stagnant virgin forest that are getting no selective cutting treatment whatsoever" (Munger 1936).

Armed with their conviction that old-growth was decadent and wasteful, foresters set out to clean up the forest and make it productive. Every early sales contract and management plan stipulated that contractors had to remove all snags, deadwood, insect-damaged, and fungi-damaged trees from the site (e.g., Miles 1911). Foresters believed that disease, deadwood, old-growth, and fire all detracted from efficient timber production. The role of the forest was to grow trees as fast as it could, and any element that was not directly contributing to that goal was bad. Whatever was not producing timber competed with trees that could be producing timber. Any space that a dead tree occupied, any light that a fir tree used, any nutrients that an insect chewed up—those were stolen from productive trees. If timber trees did not use all the available water, that water was wasted. If young, vigorous pines did not get all the sun, that sun was lost forever.

Such assumptions made it difficult for foresters to imagine that insects, waste, disease, and decadence might be essential for forest communities—indeed, that the productive part of the forest might depend on the unproductive part of the forest.

Liquidating Old-Growth

For all the foresters' desire to cut old-growth, the Forest Service sold minimal timber in the Blues until after World War I (Evans 1912; Clary 1986). Forest Service timber was inaccessible, prices were so high that few contractors were willing to invest, and industry still had enough private stock to make sales of federal timber unattractive. After World War I, however, markets for national forest timber opened up, and the Forest Service began to push sales of ponderosa pine in the Blues. This enabled them to begin in earnest the campaign to regulate the forests by liquidating old-growth.

But the buyers of that timber needed railroads to get it to their markets. Railroads were extraordinarily expensive, particularly after World War I, and financing them required capital not available within the region. Large midwestern lumber companies were interested in spending money on railroads only if they were promised sales large enough and rapid enough to cover their investments. The results in the Blues, as across the West, often damaged both the land and the local communities that depended on that land.

To spur regional railroad development in the 1920s, Forest Service planners encouraged the construction of mills whose annual capacities far exceeded what the Forest Service could supply on a sustained-yield basis. On the Malheur National Forest alone, for example, two large sales during the 1920s offered more than 2 billion board feet of pine; the entire forest had only 7 billion. Two mills followed—one capable of processing 60 million board feet a year, and another that could process 70 million to 75 million board feet

(USDA-FS 1922). With mill capacities reaching 135 million board feet a year, it would take only 15 years—not the 60 years of the cutting cycle—to process the 2 billion board feet in the sales, and only 52 years to process all the ponderosa on the entire forest.

Throughout the 1920s, foresters set up plans knowing that harvests would drop by at least 40 percent, leading to probable mill closures in the 1980s (USDA-FS n.d.). This, unfortunately, is what happened. Harvests collapsed at the beginning of the 1990s—not solely because of environmental restrictions, but because planners set it up that way in the 1920s, figuring it was a reasonable price to pay for getting forests regulated as fast as possible. Their motive was not to profit from sales of old-growth, but to reshape the forests to fit their dream of scientific efficiency. They thought their goals were purely rational, their motives untainted by the desire for gain, their plans beyond question. What they failed to recognize was the degree to which their culture—a culture that stressed efficiency and loathed waste—had shaped their definition of an ideal forest.

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Higher elevation forests in the Blue Mountains, 1929.

Restoring the Blues

As part of an attempt to resolve the conflicts over the best way to restore forest health to the Blue Mountains and other public lands within the inland Columbia Basin, in July 1993 President Clinton directed "the Forest Service to develop a scientifically sound and ecosystem-based strategy for management of eastside forests." Soon after, the Forest Service and Bureau of Land Management formed the Interior Columbia Basin Ecosystem Management Project (ICBEMP) to develop a framework for adaptive ecosystem management of the inland West.

After years of effort, dozens of public meetings, and many thousands of pages of analysis, in March 2000 the ICBEMP team released its recommendations for adaptive management and forest restoration (ICBEMP 2000). The preferred alternative calls for active rather than passive restoration. Instead of hoping that the forests will heal themselves, the ICBEMP team recommends extensive thinning of small-diameter trees, which they project will increase timber harvests by 21 percent from current levels.

That is a controversial decision, of course: Some environmentalists wanted harvest levels reduced, and many in the timber industry were hoping for larger increases in harvests. Although it advocates for active restoration through timber harvests and prescribed burning, the ICBEMP report acknowledges the uncertainty and complexity inherent in these decisions. Will anyone want to buy this smaller-diameter timber? Will thinning and prescribed fires actually work on these sites? Rather than avoiding these uncertainties, the ICBEMP team calls for adaptive ecosystem management as a process that will allow the agencies to manage in the face of changing scientific information about forest processes, while navigating changing cultural values and conflicts over forest uses (ICBEMP 2000).

Adaptive management attempts to use some of the findings of dynamic ecology to manage natural resources, not for maximum commodity production or for preservation of current conditions, but for the perpetuation of patterns and processes that allow the ecosystem to persist. Adaptive ecosystem management rests on the assumption that all ecosystems change, often in ways that are difficult for people to predict. Because humans have influenced ecological processes and patterns, understanding human disturbances is important for understanding current ecosystem functions. Adaptive management therefore attempts to consider the changing social framework as well as the changing natural framework.

Ironically, adaptive management is not a new idea in the Blue Mountains. Nearly a century ago, Frederick Ames (1910) warned that before foresters could begin to manage the Western forests, they needed to recognize that they did not understand the forest well enough to predict its response to management. Nevertheless, they had to manage; even doing nothing at all was a form of management. What they should do, therefore, was treat "all of sales as a vast experiment." Ames outlined an ambitious monitoring plan in which every three years foresters would record the response of each site to the "experimental treatment." Over the next 100 years, they could compare the effects of different kinds of logging, fire exclusion, and grazing on different forest conditions. Ames asked them to pay close attention to both the forest and the effects of human actions on the forest. In modern terms, Ames was calling for adaptive management.

Unfortunately, his idea proved unworkable. Even when conscientious foresters gathered all the data Ames called for, their reports accumulated dust, first on the top of the supervisor's desk, then in the office filing cabinets, then in cardboard boxes in storage. No one knew what to do with all this information, yet it continued to multiply as managers sought a solution. When foresters did try to monitor the effects of logging, superiors in the regional offices usually shied away from making recommended changes, often for political reasons. Caution seemed easier

than adapting to uncertainties, given the pressures on foresters to make timber available for sale (Ames 1915).

Adaptive management is no easier today than it was in Ames's time, but several critical factors have increased its likelihood of success. First, tools for monitoring and for managing information have improved exponentially. Evolving technologies allow managers to incorporate huge quantities of information into their planning process. But additional information alone may not necessarily lead to better decisions, if institutional structures constrain management options. Perhaps more important than new information-processing tools are the shifts in goals. The Forest Service now argues that maximum timber production is not a valid goal for managing federal lands in the Blue Mountains, and that complexity and uncertainty cannot be ignored if forests are to be restored to health.

Instead of using scientific expertise to avoid difficult tradeoffs, the ICBEMP draft environmental impact statement addresses the issue on the first page (ICBEMP 2000). Likewise, instead of trying to ignore value-based conflicts between users, the ICBEMP team recognizes that negotiating these conflicts is crucial to sustainable forest management. For example, after extensive public meetings, the ICBEMP team received 83,000 comments on their 1998 draft environmental impact statement, which then shaped the supplemental draft released in March 2000 (ICBEMP 2000).

As scientific understanding of forests changes, and as society's values change, forest managers must negotiate a path that adapts to change without sacrificing the basis of the forests' future productivity. In the current debates over forest management, science can inform the debate by describing likely outcomes of different alternatives and identifying the biophysical constraints that define the alternatives. But changing social values and priorities, not science alone, will be the final determinants of sustainable forest management.

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