

ECOSYSTEMS AND PEOPLE: MANAGING FORESTS FOR MUTUAL GAINS



IN SUMMARY

The debate over forest management has often portrayed management choices as tradeoffs between ecological and socioeconomic values. Scientists at Pacific Northwest (PNW) Research Station, along with their colleagues at universities and national forests, decided to look scientifically at the question: “Can we as a society produce wood products and other forest values in an environmentally acceptable and sustainable manner?”

They translated the philosophical question into this research proposition:

Commodity production (timber and nontimber forest products) and the other forest values (biodiversity, fish, and wildlife habitat) can be simultaneously produced from the same area in a socially acceptable manner.

Research in the Pacific Northwest shows promising ways to expand the framework—alternatives for managing forest ecosystems that avoid “either-or” choices. At

the scale of individual stands, young-growth forests can be managed for some wildlife and biodiversity values as well as for wood. Yet an individual stand, whether young or old, cannot provide habitat for all species. Thus some values are compatible only at the watershed or landscape scale, an area large enough to have stands of many ages and types. At this larger scale, scientists have developed new tools for landscape-scale analysis that develop information on options and reveal the large-scale patterns of past management. Changing and conflicting social values mean that the social aspects of compatible management can be the most challenging. Research can offer managers new strategies for working with the public to come up with mutually acceptable solutions.

Compatible forest management looks for ways to sustain human uses of forests and biodiversity in forests. The challenges are huge, but science offers suggestions on opportunities to manage natural resources for mutual gains.



What can science offer to the debate on forest management?

The goals of forest management are debated intensely in the Western United States—old growth, wildlife habitat, clean water, recreation, and timber. People have many ideas on what’s valuable about a forest, and many see these values as either-or choices. The familiar “jobs vs. the environment” framework assumes that forest management is a zero-sum enterprise.

Scientists at PNW Research Station, along with their colleagues at universities and national forests, decided to look scientifically at the issues. “We thought that resources could

be managed for mutual gains,” comments Richard Haynes, Program Manager for the Station’s Human and Natural Resources Interactions Program (HNRI).

“So we translated the philosophical questions into science questions,” adds Robert Monserud, scientist and team leader in HNRI. The questions are urgent, given the Pacific Northwest’s growing population and the Nation’s growing demand for wood products and, at the same time, our awareness of the importance of a healthy environment. Haynes and Monserud worked with Adelaide Johnson, research hydrologist in the Station’s Aquatic and Land Interactions Program, and other colleagues to develop a proposition to test. Their research proposition was:

Commodity production (timber and nontimber forest products) and the other forest values (biodiversity, fish and wildlife habitat) can be simultaneously produced from the same area in a socially acceptable manner.

The group defined compatible forest management as an approach that simultaneously produces multiple products of value without decreasing other values, all in a socially acceptable manner. They believed they could offer ways to expand the discussion—new possibilities for managing forests in sustainable ways that benefit the environment and sustain healthy communities.

The production possibilities model is a useful tool for moving from general discussion into analysis. This elegant model brings the essential features of compatible forest management into sharp focus.

Economic concepts of efficiency are central to the production possibilities model. If nobody is worse off and somebody is better off, this situation is more efficient than the status quo. It makes a fuller use of forest resources.

Key Findings

- A production possibilities analysis shows that in some cases, gains can be made in one forest value at no cost to other forest values. Such an alternative would be more efficient than the status quo, in the sense of being a fuller use of forest resources. A production possibilities analysis also identifies cases where increasing one forest use would require some tradeoff in another use, and it can show what the cost of the tradeoff would be.
- Young-growth forests can be managed for ecological values as well as for wood. Expanded objectives require managing multiple ecological processes such as diversity in tree species, stand complexity, and understory development over the long term.
- Landscape-level analysis is essential to identify watershed or regional changes resulting from stand-level management actions. These landscape analyses can develop information on options that increase compatibility for a watershed or several adjacent watersheds.
- People’s judgments and their durability are affected by people’s level of trust in forest managers, their personal experiences with place, their ideas about what “natural” is, the degree of risk seen in management actions, and people’s reliance on their values or experiential knowledge in addition to scientific knowledge. Even management decisions and actions supported by sound science will ultimately fail if social acceptance is lacking.
- The weight of the supporting direct and synthetic evidence confirms the proposition that forest managers can produce both commodity products and other forest values simultaneously. Although both empirical evidence and modeling results suggest that this can be done at different scales, the provisional nature of social acceptance suggests caution in saying that this can be done at all scales in a socially acceptable fashion.

Purpose of PNW Science Update

The purpose of the *PNW Science Update* is to contribute scientific knowledge for pressing decisions about natural resource and environmental issues.

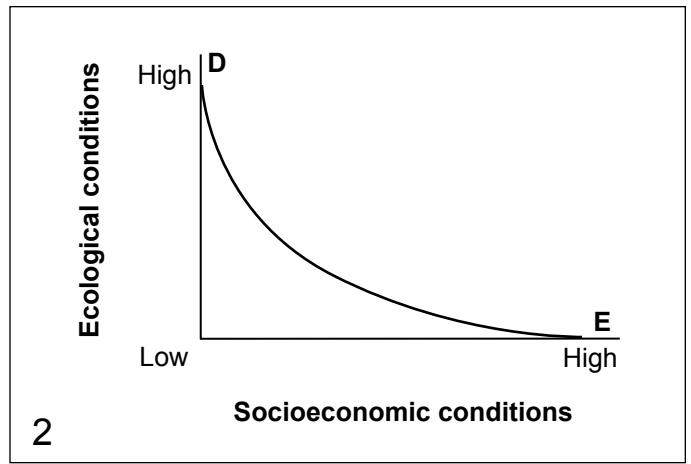
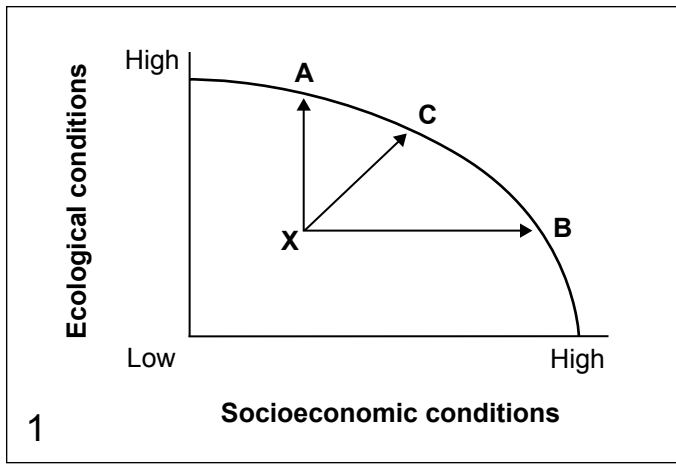
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Our mission is to generate and communicate scientific knowledge that helps people understand and make informed choices about people, natural resources, and the environment.

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In these figures, the curved lines are the production possibilities frontier. All combinations along the curve and inside it are possible. In figure 1 (left), if current forest management is operating at point X, then managers have many opportunities for improving the outputs of one or more values (points A, B, and C are just three of the possibilities). Figure 2 (right) shows that for a site where objectives conflict, the two uses are not very compatible.

In figures 1 and 2 (above), the horizontal axis represents socioeconomic conditions, the vertical axis ecological conditions (native biodiversity, environmental quality, etc.). The curved lines are the production possibilities frontier. All combinations along the frontier and inside it are **possible**. But some choices are more efficient than others. In figure 1, at point X, it is possible to improve socioeconomic conditions **at no cost** to ecological conditions (the line moving from X toward point B on the frontier). Or, ecological conditions could be improved **at no cost** to socioeconomic conditions (the line moving from X toward point A on the frontier). Any of these choices would be more efficient than the status quo and a fuller use of forest resources.

Real-world forest management is seldom at the frontier of efficiency, suggests Monserud. “More often,” he says, “managers are somewhere in the interior.” However, any decisions to move away from point X or any other interior point require changes in forest management. People’s reluctance to risk change can mean that no improvements are made and opportunities are lost.

Efficient management operates somewhere along the curved line of the frontier. In this model, “efficiency” is defined as the fullest possible use of forest resources, without judging which uses are best. Under this model, then, the highest possible output of ecological conditions is equally as efficient as the highest possible output of socioeconomic conditions. The model only describes the possibilities. Decisions about what is best, not only efficient, are social choices.

The curved line of the frontier shows that many choices balancing uses are also efficient. If management is already the most efficient possible and therefore somewhere along the frontier line, then increasing one forest use would require some tradeoff in another use. The steepness of the slope shows the cost of the tradeoff. In figure 1, significant gain in socioeconomic conditions could be achieved at only a small cost to ecological conditions, shown in the figure by point C. Further improvements would carry a higher cost, however. For ecological conditions, it costs little to move from A to C, but it costs more to move from C to B.

Figure 2 shows the possibilities for a different site where a socioeconomic and an ecological objective conflict. At this site, when the ecological condition is high, at point D, any improvement to the socioeconomic condition would have a heavy cost ecologically. When the socioeconomic condition is high, at point E, even a small improvement in the ecological condition is costly. For the site in figure 2, the two uses are not very compatible. An optimal choice for management might be to manage the site for only one of the uses, not trying to do both.

The figures shown here are simplified to illustrate the concept. In the real world, ecological conditions do not all respond in the same way to a given event, nor do economic conditions. For example, an event can cause one ecological condition to improve and another to worsen, or the conditions may move in the same direction but at different rates (see sidebar on page 4). The possibilities are multidimensional. In the real world, the scientists acknowledge, the answer is not “A” but “A plus or minus a few other letters.”

Can forests be managed for ecological objectives and wood?

Millions of acres of young-growth forests are growing in patches scattered across the Pacific Northwest and southeastern Alaska. Most of these young forests were initially planted and managed for timber production. Silvicultural objectives typically focused on wood quantity and quality and produced single-species, even-aged stands with uniformly spaced trees.

Managers and the public are all giving more attention to managing for wildlife and conserving biodiversity in second-growth forests.

Scientists and managers working together are finding that silvicultural practices can be used to achieve many values, however, not just to grow wood for harvest. Techniques that affect species composition, tree establishment, rate of growth,



West Cascade Range.

Production Possibilities Case Study

A CASE STUDY in the western Cascade Range of Oregon examined a three-way production possibilities frontier for timber production and two wildlife species with competing habitat needs, the common porcupine and great horned owl. Claire Montgomery, associate professor at Oregon State University, developed the case study. The great horned owl prefers mature conifer forest for nesting and the porcupine prefers younger stands. Analysis was done for a 4.2-million-acre area over a 100-year time horizon. Current management of the area is largely determined by objectives of the various public and private owners. The analysis for the three values found that,



Porcupine.

compared to current management, great horned owls could be increased 38 percent without reducing timber value or porcupine populations. Two alternatives for increasing timber value had only a small difference in timber gain but differed dramatically in effects on owls. The first increased timber value 14 percent with no decrease in great horned owls. The second increased timber value by 15 percent, but reduced the great horned owl population by 55 percent—a huge effect on owls for only a slight gain in timber value.

The decision on which option is best involves value judgments on the three uses—a factor outside the model and in the realm of social values. The model clearly delineates the tradeoffs and identifies cases where change would have significant results. Value judgments are also involved in the choice of which forest uses to model and the evaluation of the tradeoffs.



Great horned owl.

© Bruce Marcot

and stand structure can be used to develop the characteristics of native forests on managed lands. Foresters are using silvicultural techniques to promote characteristics such as large-diameter trees, trees with large limbs, stands with multilayered canopies, and patches with varied densities throughout young-growth stands. New objectives include wildlife habitat, structural complexity, understory development, diversity in tree species as well as other plants and animals, and the conservation of aquatic resources.

Young-growth stands managed for ecological objectives have been referred to as “the third forest”—an emerging possibility different from old-growth forests and even-aged second-growth forests. The third forest is managed for ecological benefits and wood production, goals that require a deep understanding of forest ecology (see sidebar on page 6) and a sophisticated use of silvicultural techniques. Science contributes in both areas.

Managers and the public are all giving more attention to managing for wildlife and conserving biodiversity in second-growth forests. Managing for wildlife requires managing multiple ecological processes over the long term. Wildlife objectives may relate to keystone species complexes; flagship or charismatic species; links among populations, communities, biodiversity, and biocomplexity; ecological processes; and forest development in dynamic landscapes. Some species, such as salmon and Roosevelt elk, can be indicators of total landscape functions, owing to the species’ wide ranges and dependence on a number of habitats throughout their life histories.

Results from several studies suggest that joint, efficient production of many forest values, including wildlife and social sustainability among others, is possible. Experimental treatments in second-growth forests have proven successful at producing biocomplexity. Variable-density thinning increases the diversity of forest structure and composition while removing some wood.

In a modeling study for lands in western Washington, intensive management with 40-year rotations was compared to an alternative that managed for biodiversity, including wildlife, wood, water, and clean air benefits. The biodiversity alternative included harvest, legacy retention, planting, variable-density thinnings, and accelerated development of habitat breadth and niche diversification, on rotations that alternated between 70 and 130 years. Biodiversity management was more than three times more effective than short-rotation management in ecological performance, as measured by forest floor function, vertebrate diversity, and numbers of deer and elk. Biodiversity management would produce some spotted owl habitat, and short-rotation management would not.

Young forests yield useful products besides wood, and silvicultural practices influence these products also. Edible mushrooms, huckleberries, plants used by florists such as beargrass and salal, and medicinal plants are some of these nontimber forest products. Studies of silvicultural effects on chanterelle



In rural Alaska, the average annual harvest of all subsistence food, including game, seafood, and berries, is 375 pounds per person. Here, Native Alaskans pick salmonberries. People in Oregon and Washington harvest game, mushrooms, huckleberries, and other foods as part of their food supply.

and morel mushrooms, commercially valuable mushrooms, found that mushroom production is compatible with wood production. Frequent light thinnings were best for most mushroom species, if soil compaction was avoided. Huckleberry is an understory species important in local cultures and economies, especially for indigenous people. The abundance of huckleberry shrubs is lower in shady stands and highest in stands with large trees (likely because more light reaches the ground).

A number of large-scale management experiments are underway in the Pacific Northwest to examine silvicultural alternatives to traditional even-age management. These studies emphasize joint production and alternatives to clearcutting, concepts central to compatible forest management. They involve various types of partial cuts and variable retention, and most treatments emphasize accelerating the development of old-forest structural characteristics and retaining biological legacies.

The demonstration of ecosystem management options (DEMO) study is testing new harvest strategies for mature Douglas-fir forests in western Washington and Oregon. Six harvest treatments used different levels and patterns of green-tree retention in harvest units about 31 acres each (one treatment is a no-harvest control). Through ongoing sampling, scientists are learning how the different treatments affect forests, including changes in understory plant abundance and diversity, breeding birds, forest-floor small mammals, tree-dwelling rodents, amphibians, canopy arthropods, and fungi. One study examines how the different treatments affect people; scientists are evaluating public perceptions of the harvest units, including reactions to harvest intensity and the dispersed vs. aggregated patterns of green-tree retention. Traditional timber harvest studies focused on how much wood the forest could produce and the best ways to harvest wood. The DEMO studies focus on what is left in the forest rather than on what is taken out.

Red Alder and Conifer Forests in Southeast Alaska

SOUTHEAST ALASKA has many stands of young-growth forests. Scientists are studying ways to produce wood, wildlife habitat, and fisheries simultaneously from these young-growth forests, and they are finding that red alder plays many ecological roles in young forests.

Red alders have a faster, shorter life history than conifers, and this difference becomes part of alders' ecological contribution to forests. Red alders grow rapidly as very young trees and die when 60 to 100 years old. Conifers, on the other hand, start slower but then overtop alders and continue to live for hundreds of years. The deciduous alders, a nitrogen-fixing species, drop leaves rich in nitrates to the forest floor, food for decomposers and invertebrates. More light reaches the forest floor, encouraging plant growth.

In one observational study on Prince of Wales Island, scientists identified nine mixed alder-conifer stands that had grown after timber harvest between 1958 and 1962. The roughly 40-year-old stands ranged from 79 percent alder to almost pure conifer stands; high levels of alder were associated with previous disturbance such as roads or landslides. Nearly pure conifer stands had sparse understories that provided little browse for Sitka black-tailed deer, sparse foliage for plant-eating insects, and few nesting sites for songbirds. The conifer stands had lower songbird density than stands with more alder, probably due to the lack of insect prey and nesting sites.



Aerial view of Maybeso Experimental Forest, Prince of Wales Island. Alder patches show as lighter green, shorter, and more rounded tree crowns than conifer patches. The closeup photos (right) show a nearly pure alder stand with thick understory vegetation and a pure conifer stand with a predominantly fern and moss understory, respectively.

Total understory and herbaceous plant cover increased with an increasing proportion of alder; more understory plants provide more browse for deer. Plant species richness was greatest in mixed stands with 18 to 51 percent alder. Mixed alder-conifer stands had more plant-eating insects, higher songbird density, and larger populations of deer. Also, alder fixes nitrogen, a vital nutrient for tree growth.

Streams with the most riparian red alder delivered about four times more invertebrate biomass than streams canopied mainly with conifers; alder streams delivered more organic litter downstream. Upstream reaches dominated by red alder supplied more invertebrates (food for fish) and organic detritus (food for invertebrates) to downstream fish-bearing reaches.

In sum, young-growth stands with red alder had a more species-rich and abundant understory plant community; more terrestrial invertebrates; and higher nitrate levels and more light reaching streams, in turn leading to more aquatic invertebrates that are prey for selected bird species and downstream fish. Mixed alder-conifer stands appeared to support a greater overall diversity and productivity in the forest ecosystem.

Red alders also left legacies in maturing forests long after they died and decayed. Gaps left by dead alders introduced structural diversity into stands. Alders fallen into streams became an intermediate source of wood in the stream ecosystems, until longer-lived conifers begin to topple into streams.



Ultimately, red alder in young Alaskan forests, once looked upon as a “weed” tree and slashed or sprayed, plays ecological roles from the headwaters and uplands of watersheds, downslope to fish-bearing streams lower in the watersheds. These findings likely have relevance in other forests as well.



Forests can be managed for a number of values by using varied silvicultural prescriptions tailored to specific stands. Silvicultural practices include legacy retention, precommercial thinning, commercial thinning (shown here), gap creation, and understory planting, among others.

On Washington's Olympic Peninsula, a habitat development study is testing the effects of variable-density thinning and other practices on small-mammal populations in 30- to 70-year-old stands. Scientists expect the study to yield new

Northern flying squirrels play pivotal roles in Douglas-fir forests. Thus, management practices that are good for flying squirrels and truffles are likely to also be good for tree growth and forest productivity.

information on the relations among stand complexity, small mammals, food and energy networks, and ecosystem functions. Small mammals such as northern flying squirrels play pivotal roles in a keystone complex in Douglas-fir forests. As a favorite food of spotted owls and American martens, flying squirrels are a crucial part of the food chain. Flying squirrels, in turn, like to eat truffles, the spore-producing bodies of mycorrhizal fungi that help tree roots absorb water and nutrients. By eating truffles, flying squirrels distribute the spores throughout the forest. Thus, management practices good for flying squirrels and truffles are likely to also be good for tree growth and forest productivity. The Olympic habitat development study will provide better data on these practices than currently exists.

An advantage of the operational-scale studies is that the results can be interpreted directly, with no risk of bias by scaling up from very small plots to an operational level. The studies test the real-world feasibility of managing for ecological objectives and wood. Results so far are promising.

Are some values compatible only at a landscape scale?

Yes. Even the best silvicultural practices cannot produce all values on every acre. For example, diverse, healthy, young forests still do not provide habitat for old forest-dependent species. A diversity of stand structures and ages are needed across the landscape to conserve biodiversity.

“What is incompatible at a small scale, such as one stand, may be compatible on a larger scale, a watershed or a landscape,” Haynes comments. Specific issues emerge at particular scales. The landscape scale is a critical bridge between the forest-stand scale, at which trees are cut or planted, and the regional scale, such as the range of the northern spotted owl.

Scientists have developed new tools for landscape-scale analysis, by using geographic information systems (GIS) layers, databases, and advanced computer capabilities. Several types of models offer different approaches at different scales; all are designed to analyze the effects of forest management

across large and complex ecosystems. Stand-based landscape models, visualization tools, successional pathways models, and landscape optimization models all offer different ways to look at long-term changes and forest patterns across large landscapes. Most models can be used to develop information on options that increase compatibility.

Land ownership, and the diversity of landowner goals, are key to the landscape pattern now becoming apparent in the Oregon Coast Range.

The coastal landscape analysis and modeling study (CLAMS) integrates social and ecological data for the Oregon Coast Range. CLAMS provides detailed dynamic mapping of the whole landscape, including forests, streams, wildlife habitats, land uses, and human decisions. It handles many different fine- and coarse-scale ecological indicators, and models how both social and ecological changes might affect the landscape.

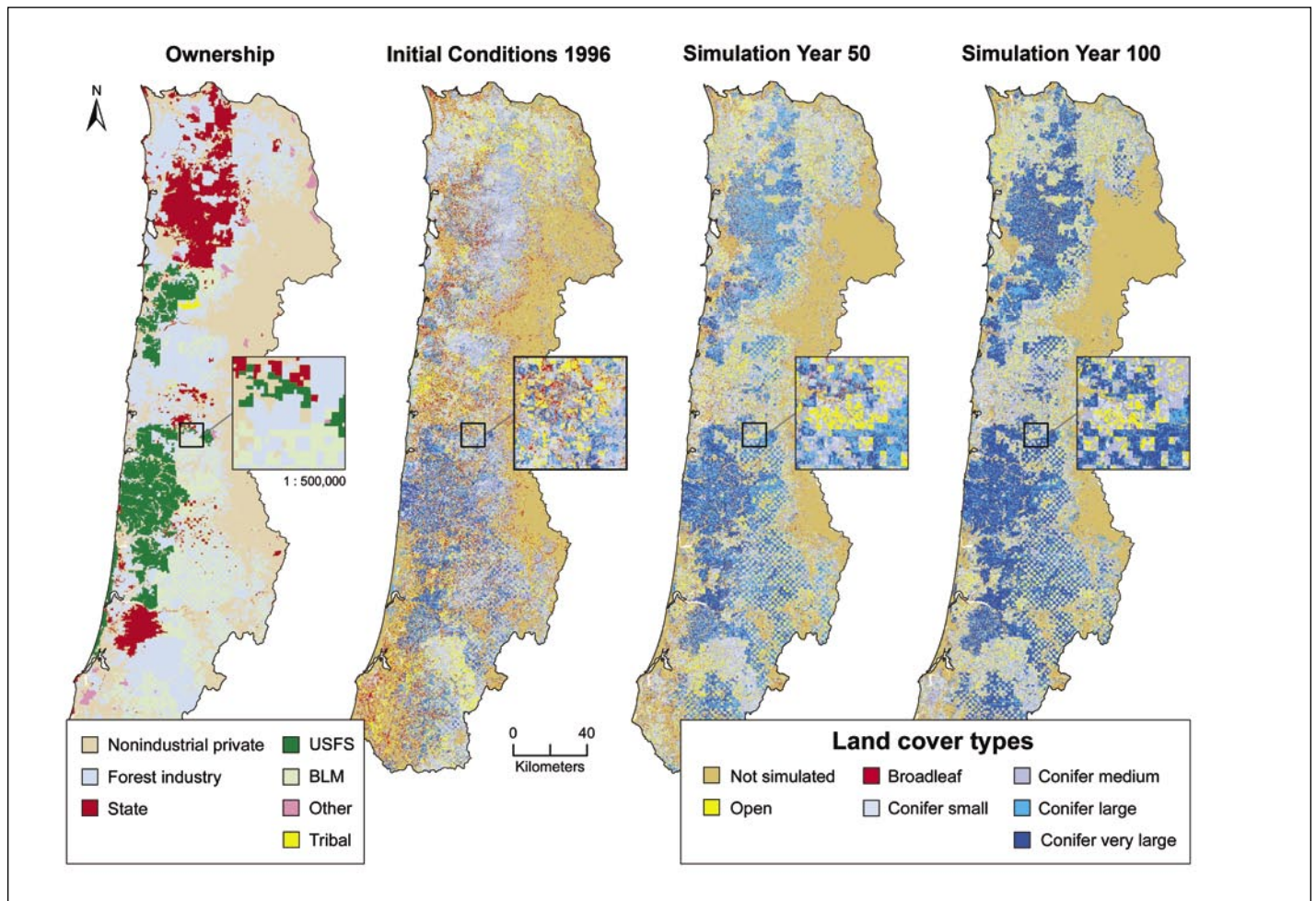
Results from CLAMS show that broad-scale changes are just now emerging from accumulated decades of stand-level management actions. Land ownership, and the diversity of land-



Oregon Coast Range.

Courtesy of CLAMS team

owner goals, are key to the landscape pattern now becoming apparent. Oregon Coast Range forests belong to a medley of landowners—federal government, the state of Oregon, tribes, timber companies, and small woodland owners. Most federal forests are now managed for mature and old forest habitats, most industrial forests are managed on short rotations, and forests of other owners are managed for widely varying objectives. CLAMS shows that a landscape pattern with two



Graphics by Keith Olsen

In a study of the Oregon Coast Range, CLAMS shows how management policies can change forest landscapes. Vegetation classes are shown for the starting year of 1996. This scenario assumed that the 1996 policies for federal, state, industrial, and non-industrial private forests would remain the same for 100 years. Other scenarios not shown here project results for alternative policies.

sharply contrasting forests is developing, with stands less than 80 years old on privately owned forest lands, and maturing and old forests on federal lands. This landscape pattern never existed before, but it could have high species diversity, providing habitats for species that use dense young conifer forests and species that use old-growth forests. However, complex young forests with deciduous trees, shrubs, and abundant snags, are becoming uncommon in the Oregon Coast Range, a loss that will likely affect species using these habitats, such as the western bluebird.

Can forest management be compatible with conflicting social values?

Compatibility is basically about the values we assign to healthy trees, different stand structures, wood quality, wildlife, water quality, fish, and nontimber forest products, among others. But not everyone has the same opinions about how forests should be managed. Also, people's opinions change faster than trees grow. Thus actual conditions in forests are always lagging behind current views of socially desirable conditions.

Changing and conflicting social values mean that the social aspects of compatible management can be the most challenging.

The social conflicts confounding resource management will not be resolved by better answers to technical and scientific questions. To be accepted, forest management requires an approach that recognizes the legitimacy of many social values, especially those emphasizing historical, cultural, wildlife, and recreational values (see sidebar on page 10).

Changing and conflicting social values mean that the social aspects of compatible management can be the most challenging. Establishing values through market prices and nonmarket valuations may not reflect the most relevant social values pertaining to a particular issue.

Judging the proposition: can forests be managed for mutual gains?

"Scientists like experiments," comments Monserud. "But with questions this broad, we have to use other methods too. There's no way to do experimental design for broad synthesis."

"We used the weight of evidence as our guide, as the legal system does," Johnson adds. For a broad-scale proposition such as wood compatibility, judgment includes direct evidence, professional experience, and expert opinion.

Direct evidence exists at the stand scale, where specific actions take place. Evidence on the ground supports the idea that multiple resources can be simultaneously produced in a mutually beneficial manner. This evidence includes deer browsing in Alaskan forests, city water supplies coming from managed forests, and thousands of other examples.

The production possibilities analysis shows, however, substantial opportunities to improve over current management. Current management is often well below the most efficient possibility, with "efficient" referring to possibilities to increase wildlife and other values as well as wood production.

Perhaps the most promising scale for mutual gains is the watershed. Simulation results from the Blue River Landscape Study in the west-central Oregon Cascade Range showed that several environmental indicators could be increased while producing wood. Other watershed-scale studies have similar findings. The key is to manage the entire watershed simultaneously, in an integrated way, rather than in a piecemeal fashion.

Evidence for mutual gains was less conclusive for social values and markets. Consequently, the acceptability of forest practices depends on efforts by managers to engage the public and better integrate social values with forest management. Because markets are not benign and exist only for a subset of goods and services, their impact on compatible forest management is inconclusive. Both cases suggest great uncertainty about the possible implementation of compatible forest management when social values, markets, and regulatory actions are all considered.

Haynes, Monserud, Johnson, and their colleagues on the wood compatibility research met several times to discuss their finding on the wood compatibility proposition. They agreed on this statement:

Based on the weight of both the supporting direct and synthetic evidence, we accept the proposition that we can produce both commodity products and the other forest values simultaneously. Although both the scientific and empirical evidence suggests that this can be done at different scales, the provisional nature of social acceptance suggests caution in saying that this can be done at all scales in a socially acceptable fashion.

Accepting the proposition implies that forest management simultaneously produces multiple forest goods and services, maintains ecological integrity of forests, and maintains the integrity of landscapes important to people. Thus compatible forest management is complementary to sustainable forest management.

Sustainable forest management has the broader goal of contributing to economic prosperity that is socially just and environmentally sound. This goal includes consideration of the socioeconomic health of forest communities, maintenance of biodiversity in forests, and long-term forest productivity.

Broad-scale science that includes forests and people can never offer the certainty of a controlled experiment in a lab. At this point, people disagree about how forest integrity or socioeconomic health should be measured, and if those values even can be measured. Yet, the trend is toward rating forest integrity and socioeconomic resilience of forest communities. Eventually these assessments will probably become a standard part of forest reporting.

Strategies to Gain Public Acceptance

CAN FOREST MANAGERS afford *not* to involve stakeholders? Intense conflicts over forest management sometimes lead to stalemates, missed chances to improve any of the forest values, and loss of local or regional influence in policymaking.

Even when people find forest practices acceptable, their judgments are almost always provisional rather than absolute or final. Scientists evaluated the current state of knowledge regarding the factors that shape, sustain, and alter public judgments about the acceptability of various forest management conditions and practices. People form judgments through a complex of factors, with technical and scientific information only one of these.

People's judgments and their durability are affected by people's level of trust in managers, their personal experiences with place, their ideas about what "natural" is, the degree of risk seen in management actions, and people's reliance on their values or experiential knowledge in addition to scientific knowledge.

The research suggests that even management decisions and actions supported by sound science will ultimately fail if social acceptance is lacking.

However, the research also identifies strategies to gain public acceptance. Suggested strategies include:

- Treat social acceptability as a process rather than an end product.
- Develop organizational capacity to respond to public concerns.
- Approach trust-building as the central long-term goal of effective public process.
- Provide leadership to develop a shared understanding of forest conditions and practices.



People have different ideas about how to spend time outdoors. In Ketchikan, Alaska, sea kayakers paddle past a cruise ship, while a fishing boat passes behind them.

- Focus on the larger context within which forest landscapes are managed, including uncertainties and risks.

Conflicts about natural resources can be considered struggles over the meanings of "place." Resource managers may want to consider public involvement approaches that give people a chance to explore the meanings of places, learn what other people value in places, and negotiate the range of meanings assigned to particular places.

These place-based approaches include field trips, meetings with discussions (not just hearings or listening posts), and opportunities for dialogue and mutual learning. Methods of gathering information might include oral histories and ethnographic interviews, and also conventional surveys. Place-based approaches require managers to use social processes such as multiparty negotiation and collaboration, to give people the chance to express, negotiate, and transform meanings about places.

These approaches take considerable time and energy, but the reward can be the resolution of conflicts over resource management. Trust-building is slow—but it's still faster than the alternative.

No one style of forest management will meet all of society's needs or desires. Right now the Pacific Northwest and Alaska have a rich legacy of forests managed by a variety of individuals for many goods and services. All the individual actions of many landowners and forest managers will continue to shape these forests, and those actions, along with natural events and ecological differences, will create diverse forests along the

Pacific Coast of North America. This diversity may help to achieve compatibility at a landscape scale.

"What we see and study now is the signature of management from 30 to 50 years ago," comments Haynes. "We won't know the full results of what we're doing today for 30 to 50 years."

Contacts

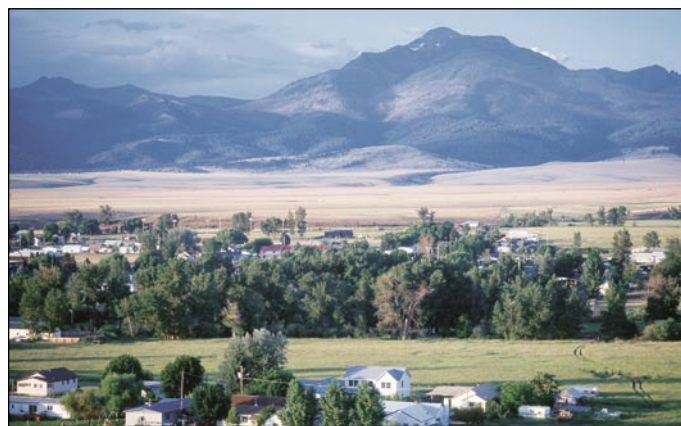
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Forest communities are as diverse as forest ecosystems. (Above) Juneau, Alaska, near the Tongass National Forest, relies on tourism and state government as major industries. (Below) Prairie City, Oregon, near the Malheur National Forest, relies on ranching, farming, and timber as major industries.



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For Further Reading

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