Patient Money: the Economics of Low-Impact Forestry

If low-impact forestry has clear advantages for minimizing stand damage, maintaining wildlife habitat, protecting aesthetic resources, and enhancing recreational aspects of a forest, why isn't it the forestry norm? Many people might conclude that LIF must be uneconomic--the costs probably outweigh the benefits, otherwise more people would be doing it. If LIF makes economic sense, there would be few excuses to not practice it.

Low-impact forestry does *make economic sense within an ecological/social perspective and the assumptions that go along with that perspective. This perspective assumes that economics is embedded in nature and society and not the other way around. Not all forest landowners reading this chapter will immediately switch over, however. Forestry economics is complicated and not all landowners operate within the same perspective.*

LIF assumptions. Low-impact forestry economics operates from the following assumptions:

- Look at *Total Value* (removals plus residuals), not just removals. From this perspective, damage to residuals is considered a *cost*.
- Consider both long-term and short-term, costs and benefits. We assume there will be a future. Analysis of sustainable forestry should consider impacts over generations. What maximizes returns over the short term may be doing so at the expense of the long term.
- Look at impacts to all the players (landowners, loggers, and the local community), not just one at the expense of others. While it is possible to get higher returns for landowners by exploiting labor, for example, doing so hurts the whole economic system (the community) to which the landowner belongs. From the holistic perspective, such benefits to a part are not a benefit to the whole.
- Avoid externalizing costs to others or to future generations. Damage to productivity, water quality, soils, residual trees, aesthetics, or property values should be considered costs--even if an exact dollar value can not be easily attributed to them and even if "someone else" pays the costs.
- Do not confuse income with capital depletion.

Income or Capital Depletion?

The confusion over income and capital depletion comes from ignoring the concept of *total value*. Consider the following analogy with financial investments. If you have $10,000 in a fund that earns 10% a year, you could remove $1,000 a year and still have your principal undiminished each year. But suppose you remove $1,000 one year, $1,500 the next year, $2,000 the next year, etc.. You might get excited and brag to your friends that your "income" from your investment is growing every year. Unfortunately, after 5 years there will be no "income" because there will be no principal. If, over time, what goes out of the system is greater than that which goes in, the system is not sustainable.

Forests have natural capital that affects growth and stability such as:

- the stocking, size, and quality of standing trees;
- soil fertility factors--including species and processes that affect nutrient availability;
- species and processes that increase resistance to catastrophic disturbances;
- biological legacies that persist through disturbances and improve resilience;
- genetic adaptations of trees and other species to the site and to potential change over time.

To the extent that this natural capital is diminished at a rate faster than it can be replenished or to the extent that its ability to function fully is compromised, the forest principal has declined and true sustainable income will be less. Such damage, therefore, is a cost to be avoided.

Landowner objectives. Foresters and loggers tend to meet landowner objectives as a first priority, even if these objectives conflict with sound silviculture or sound ecology. Not all landowners share the LIF goals as their prime objectives. Landowner objectives and landowner economic perspectives vary widely due to such factors as:

- *Type of landowner.* Public ownership may have requirements for "multiple use." Contractor-owners may be more concerned with cutting enough wood to meet payments on equipment or land than with managing for the long run. Some small woodlot owners may value the land more highly as an aesthetic neighborhood buffer than as a major source of income.
- *Size of ownership.* Small landowners who want a steady income avoid clearcutting. Clearcutting gives a big pulse of income (and income taxes) and then expenses for early-stand management followed by a lifetime of no income (but continued property taxes). Large landowners, in contrast, can justify managing in blocks and balancing early-stand expenses with income from final cuts elsewhere. Some landowners are so large that they can distort local markets in their favor. These types of landowners can, for example, leverage wage levels below what would be a free-market price--because these landowners may be "the only game in town."
- *Degree of vertical integration.* Some industrial landowners, who do not see their woodlands as a "profit center," can justify "selling" wood, which could have become sawlogs, as pulpwood to their own mills--if this floods the market enough to keep purchase prices low. Maximizing income for the woods division may not be as important as assuring a cheap, stable supply for the mill.
- *Location of headquarters.* It makes a difference if the landowner is absentee or lives on the land. Resident landowners are more apt to be more concerned over community costs that they will have to live with. Local owners tend to spend more profits locally, enhancing local communities.
- *Location of timberlands in relation to markets and labor.* Distance from markets can affect stumpage, mill-delivered prices, and trucking. It also makes a difference if the labor is migratory or lives in the same community as the land. Local labor will tend to spend more wage money locally.
- *Presence and availability of loans, subsidies, taxes, or tax breaks.* When land is purchased with large short-term loans, the perspective of the landowner on management is different from those whose land was bought generations ago. Big short-term returns are required. Management decisions can change when government "assistance" is available. Clearcuts, for example, become much more viable if someone else pays for the required early-stand management expenses.

  When taxes are low enough, holding heavily-cut land that has low productivity becomes less of a burden. Low taxes allow a landowner to cut heavily now, and take some time to find a buyer for the cut-over land.

  Subsidies can make practices that normally would be uneconomic more cost-effective. This could shift investments into less efficient directions.
- *Regulations (or lack of them).* Regulations might restrain certain types of cutting in certain types of areas. Landowners are not supposed to clearcut riparian zones, deer yards, or high-altitude zones on mountains. On the other hand, to the extent that regulations allow

abusive cutting, subdivisions, and sales in areas with high land values--even without mature forests on the ground--landowners who want to maximize their short-term returns can be amply rewarded. Such short-term gains can be more enticing to some landowners than the long-term benefits of LIF.

Logging economics. Even when landowner objectives are similar, logging economics can vary widely due to the following factors:

- *Type of loggers.* It makes a difference whether the loggers are large contractors, small contractors (who do the cutting themselves), employees of the landowner, or the landowners themselves. These differences will be reflected in differences in both costs (such as workers compensation) and benefits. Larger contractors, for example, may be able to secure higher wood prices, but they may also have heavy debts for equipment, compelling heavy cutting. Owner-cutters can keep a higher proportion of mill-delivered prices and can more easily justify more careful practices.
- *Type of forest.* The stand type, soil type, stocking, tree size and quality, scale of cut, slope, season, and presence of sensitive areas (such as water bodies or deer yards) can all have major impacts on costs and benefits from a logging operation. Some stands, due to their poor quality, remote location, or difficult terrain, may not be worth cutting at all. While some landowners with a long-term perspective might have little trouble justifying low-impact forestry on the whole ownership (for example, land trusts, institutional owners, families with roots), even owners with shorter horizons may find it justifiable to use low-impact methods in sensitive areas, such as riparian zones, or near recreational areas.
- *Type of equipment.* The economics of logging equipment depend on whether the machines are used or new, and the appropriateness for the site, the size, and type of cut. Some machines that can do a good low-impact cut in some stands, for example, may be inappropriate for others because the machine is under powered to haul big wood, or because yarding distances are too long. The economics of the equipment also depend a great deal on the operator and planning. A good cable skidder operator might be able to do a relatively-low-impact cut in an economic fashion. A poor operator could mangle the forest and rut up the soil.
- *Type of cut.* The same machine might be appropriate for one type of cut but inappropriate for another. Some large machines with high-flotation tires might be adequate for a heavy cut, but be too wide for a light cut that requires narrow trails that allow crown closure.
- *Type of market.* The economics of logging improve as the value of the wood goes up. The same wood may have a significantly different value depending on the type and location of the market. In some cases, the market value of the wood is so low that the costs of logging and trucking are higher than the mill-delivered price. In such a case it may make more sense for the logger to leave the wood in the forest to rot.

  Even for the same product, market prices can vary widely over the years, or even within one year. Shortfalls, oversupplies, and events far away can all cause dramatic swings in prices. Timing of the cut is thus an important factor in the economics of logging. For some commodities, mills that have a dominating influence over the market can get away with paying much less than what would be a true market value, which hurts both landowners and logger.
- *Cheating.* Some loggers improve their economic prospects by stealing stumpage, lying to landowners about how much wood is cut, or underpaying workers (pay for “equipment,”

rather than labor, for example, to avoid insurance or workers' comp payments). While cheating may help the prospects of the logger, it obviously does not benefit the landowner.

Each one of these factors for both landowners and loggers can cause values to vary so widely that a concise economic analysis to three decimal places is a mockery. Such variability defies an economist's ability to do comparisons with exact numbers. If one multiplies the range of variability, the result qualifies as an example of chaos.

A barrier to low-impact logging. On a good site with high-value wood and with a skilled operator, a low-impact logging operation can easily pay its way, leaving both landowner and logger happy. Such stands, unfortunately, are not the rule. Too often the stand to be worked has been repeatedly highgraded and is filled with poorly-formed and damaged trees.

The initial cut in such a stand might consist of removing low volumes of low-value wood--leaving the best wood to grow. This type of cutting takes considerable skill if the logger is to avoid damaging the residual trees and soil. It may even take specialized equipment that is not as productive as conventional equipment. The result can be that the cost of logging goes up while the value of the cut doesn't. Only so much money is available in a cord of wood. Few loggers are motivated to work harder to make less money. Few landowners are willing to have their land logged and see little money in return. Both landowners and loggers have expenses to pay. Feeling good about a cut, unfortunately, is not sufficient for paying bills. Most people prefer cash.

The barrier of low immediate cash leads some landowners to dismiss low-impact logging as "too expensive." These landowners might reason that since there are so many trees out there, it shouldn't matter if a few get damaged during logging. Some loggers might conclude that they cannot afford to do low-impact practices and be competitive at paying stumpage. Other loggers will get the bid.

In 1997, using standard accounting formulae and actual data from contractors, I compared the cost per cord of a low-impact system operating on woodlots with a mechanized system operating on industrial lands. The low-impact system used a chainsaw and forwarder equipped with a radio-controlled winch. The mechanized system used one feller buncher, two grapple skidders, a crane, and a delimber (at half time). The costs (including labor) were $45 a cord for the low-impact operation and $38 per cord for the industrial operation. Thus the low-impact system cost 18% more per cord.

Admittedly, this is an unfair comparison, because the objectives, cutting systems, and sites were different. The mechanized system is designed to cut as much wood as fast as possible. It would be very difficult for the mechanized system to leave as much wood with as little damage as the small forwarder with the radio-controlled winch. The low-impact system was also inefficient because it was a one-man operation--the machinery stood idle while the logger cut and limbed the wood. Even if the costs were more competitive for the low-impact logger, the revenues from the cut would not be. The industrial system was cutting the highest value wood, leaving little or nothing of value behind. The low-impact system was cutting mostly lower-value wood; it cost more, but had lower immediate returns in revenue.

What factors might justify low-impact forestry when immediate returns seem meager?

Immediate benefits. Although the advantages of low-impact approaches stand out most clearly in the long term, there are significant short-term benefits as well:

- *Higher residual value.* If one figures costs and benefits based on *total value* (removals plus residuals), then low-impact logging has some advantages. First, having narrower and fewer trails allows the landowner to retain more crop trees (trees of high potential value). A mechanical operation with trails every 40 feet might have to remove 25% of the quality trees (before they are ready to be cut)--just to make way for the machinery. Second, the low-impact cut damages fewer trees, leaving a more valuable residual stand.
- *Higher property value.* If property values are determined by raw-land value plus timber value, then the property value of the land would be higher after a low-impact cut than after a more standard operation. Not only is the timber value higher, but the aesthetic and recreational values are higher as well. High-grading operations can not only lower the property values of the land cut, they can also have a shadow impact over adjacent lands. Poorly-cut lands can be visually distressing and can lower the value of neighboring properties. To large, absentee landowners, unfortunately, this may not be an issue.
- *Higher wildlife value.* Although wildlife values are best measured with biological, rather than economic criteria, retaining large trees, more shade and vertical structure, and more interior forest is a clear advantage. In some parts of the state, such habitats are in short supply.
- *Better quality soil and water*. Low-impact cuts lead to less compaction and rutting of the soil, more shade to the soil, and less chance of silting and warming of streams.
- *More jobs.* In the example I gave comparing the logging costs of two cutting systems, the major factor for higher costs of the low-impact system was labor. Labor was 60% of the cost of the low-impact system, but only 25% of cost of the mechanized system.

While labor to a logging contractor might appear as an unwanted cost, to a community it is a benefit. Money paid to labor multiplies in the local community more than money paid for machinery and fuel. Much of the money for machinery goes to out-of-state equipment manufacturers, banks, and oil companies. Money paid to labor leads to more local spending on food, housing, entertainment, and other goods and services, thus supporting more local jobs. Even excluding these multiplier effects, for the same volume of wood cut, the low-impact system analyzed would employ three times as many loggers as the mechanized system. For horse logging, the difference would be even greater.

Long-term benefits. Some people mistakenly see forestry as an investment which, at best, can only give low returns. Forests grow slowly--sometimes only two or three percent a year--and thus one can only get a two or three percent return. When one factors in inflation, then the outlook is not quite so bleak--one can get two or three percent return above inflation. For example, if inflation is four percent, one can get a seven percent return--which is, at least, better than putting the money in a savings account.

However, if long-term economic returns are important, five factors should be considered (plus a few others that are harder to measure with dollar values):

1) Growth and/or volume/acre/year;
2) Species mix;
3) Product mix (pulp, logs, and grades);
4) Market value changes compared to inflation;
5) Risk from insects, disease, or wind;

plus social and biological considerations.

The combination of the five factors (plus) can lead to significant advantages of low-impact forestry over more conventional practices with shorter-term horizons. Indeed, when one considers these factors, it is hard to justify *not* moving toward lower-impact forestry.

Growth. How the forest is cut can affect the volume growth per year in a number of ways:

- With LIF, more land produces trees because less land is taken out by trails, yards, and roads. Less land in trails means more residual volume on which to have growth and more crop trees per acre. A mechanized system might remove 25% of the potential crop trees just to make trails, while a low-impact system might remove 8-10%.

Excessive feller buncher trails lower future productivity. Aerial photo by Mitch Lansky.

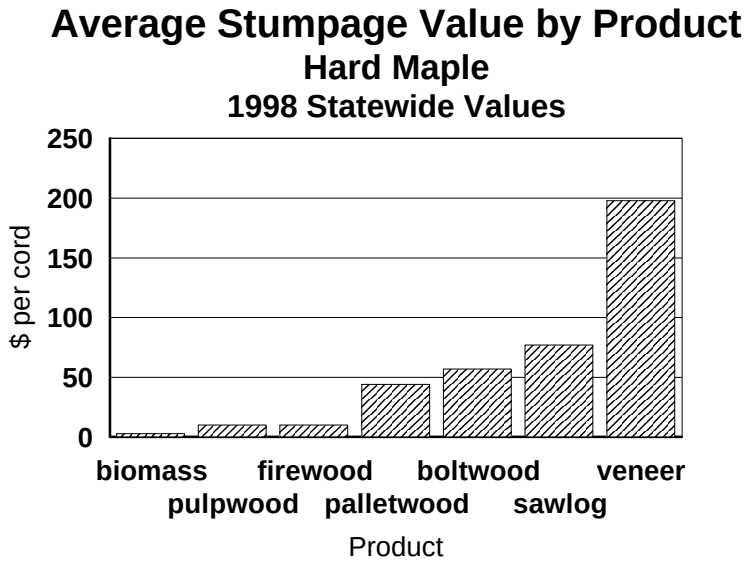
- LIF leaves less residual damage of trees and soil. When tree trunks or roots are damaged, the tree has to expend energy compartmentalizing the wound--energy that could have gone to growth. Tree damage also means an increased percentage of growth is going on lower value products. Hurting soil structure can lead to less available air, nutrients, and water to the tree roots and can impede root growth physically, as well.
- LIF favors leaving dominant, vigorous trees. Variations on diameter-limit cuts (where the biggest trees are cut, leaving the smaller ones behind) can remove the dominant trees and leave suppressed trees with smaller crowns and root systems, lowering growth rates as well as putting growth on lower-valued trees.
- Large trees are more efficient than small trees at producing stem per unit of leaves.
- Shade tolerant trees can grow under the shade of larger trees, leading to better use of the growing space than in even-aged stands.
- With shade tolerant trees already present in the understory, harvested trees are replaced faster in uneven-aged stands with less cost than in even-aged stands.

- With even-aged stands, one long rotation produces more volume at higher quality and value than two short rotations.

Species mix. LIF favors retaining longer-lived species that are suited to the site. These species are capable of growing to larger diameters and high-valued products. Shifting the species mix can lead to major differences in the value of the growth of the stand. For the same sized tree, for example, a rock maple sawlog might be worth twice as much as a red maple sawlog. Red spruce can live longer, and grow to provide more valuable products than balsam fir.

Product mix. LIF not only encourages the growth of larger trees, it also discourages tree damage that might lower the grade of a log. Dramatic increases in value occur as trees grow to different products and grades. In 1998, the average cord of rock maple veneer was worth 70 times the value of a cord of rock maple biomass.

Favoring crop trees does not lead to the total elimination of poor quality trees, but it gradually shifts the percentages of products so that more of the growth is of higher value. Trees of lower economic value still have important silvicultural value (for shade and windfirmness) and ecological value (for habitat).

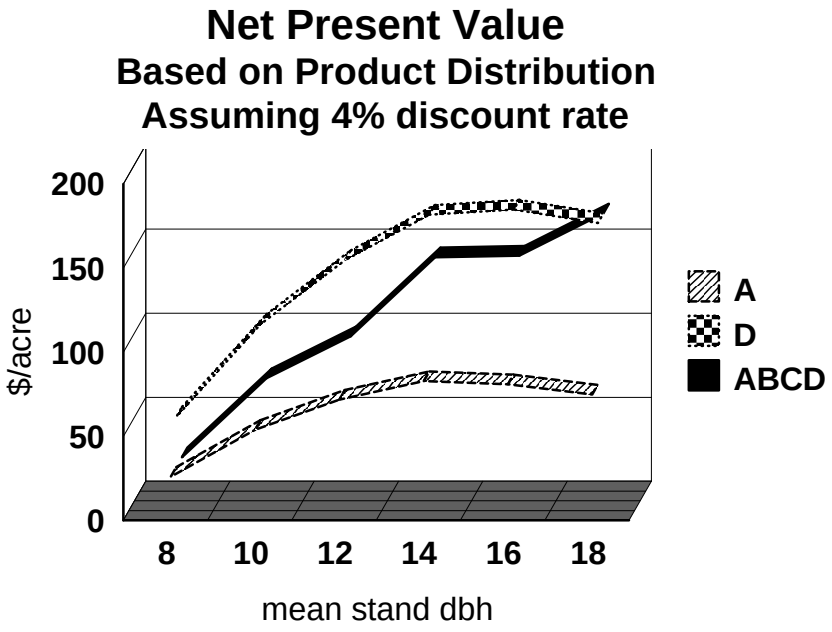


Impact of product mix on future value of stand

The following charts (based on data from USFS guide to hardwood silviculture) illustrate the benefits of managing for improved product mix. Product mix "A" has the lowest percentage of high-quality timber; "D" has the highest. In the following graph, line ABCD shows what happens to returns when product mix is improved over time from "A" to "D."

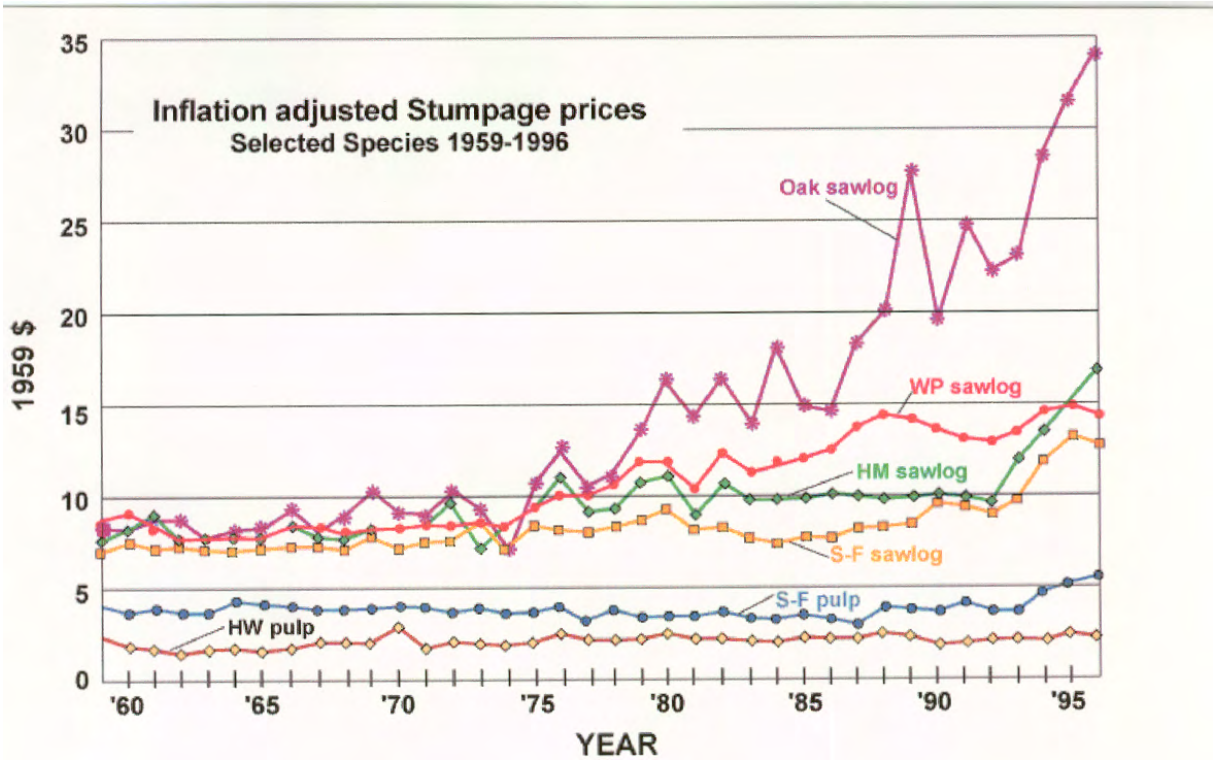
Assumed percentages of sawtimber volume

Product	Product distribution			
	A	B	C	D
Veneer	2	4	6	8
Sawlogs				
High Quality	3	6	9	12
Medium Quality	40	45	50	55
Low Quality	15	15	15	15
Pallet Stock	40	30	20	10



Market value changes. An examination of stumpage prices in Maine since 1959 shows that inflation-adjusted prices for commodities (such as pulp) hovered around inflation, but sawlogs showed modest increases in value above inflation, and veneer showed dramatic increases in value above inflation. Indeed, during the 1990s, rock maple veneer had an average increase in

value above inflation of around 20%! Even if a rock maple veneer tree had ceased to grow, it could have been a good investment *not* to cut it (assuming its quality did not decline).



Past trends will not always work in the future. New technologies of composites and laminates may change consumer preferences. High quality timber, however, is likely to continue to have favorable demand. Combining tree growth with growth in value above inflation makes protecting these high quality trees from damage a no-brainer.

Risk. All investments have a certain degree of risk. Junk bonds, for example, paid high returns, but they also had high risk--there was no guarantee that the investor would see those returns. Forestry investments also have a degree of risk from fire, wind, ice, insects, or disease. LIF lowers these risks compared to more standard approaches.

Well-stocked stands, for example, are less subject to windthrow. Favoring dominant trees for retention means leaving trees with stronger root systems that lower the chance for windthrow. Suppressed trees that get “released” when dominant trees are removed in a diameter-limit cut are more susceptible to windthrow. Long-lived, vigorous trees are also less likely to be killed by insects or disease. Trees wounded by logging have a higher chance of being invaded by insects or fungi.

Because LIF tries to leave behind a forest with a fuller range of habitats, including large trees and even dead-standing trees, the stand is more likely to have a fuller range of predators and parasites of potential pest species. For example, certain warbler species (Cape May, bay-breasted, and Blackburnian) that prefer large spruce trees for habitat can be an effective check on early stages of spruce budworm outbreaks. Stands dominated by young fir (as might be the case after a clearcut or heavy highgrade operation) will likely not have these species. Even if

trees die or fall over, the LIF trail system allows for effective salvage, so that the death of a valuable tree (that is not necessary for structure) need not be a financial loss.

Social considerations. In addition to more jobs per cord cut (mentioned under short-term benefits), LIF, because it grows higher-quality trees over the long term, can lead to increased stumpage revenues for landowners and increased opportunities for local sawmills. Improved aesthetics and recreational opportunities can also benefit the local community.

Biological considerations. The most valuable habitats are the hardest ones to grow. It is easy to create early successional habitat in a matter of days with a few big machines. In contrast, it may take a century to grow interior, late successional habitat. LIF favors retaining large trees (both live and dead) in well-stocked stands. Although LIF is no substitute for reserved forest, it compliments, rather than isolates, reserves, and therefore increases, rather than decreases, the value of reserves or wilderness.

But can you get there from here? "There" is a well-stocked stand of high-value wood. If "here" is a stand with enough good wood

Mel Ames proves you can get there from here

Mel and Betty Ames have been managing their woods in Atkinson for over 50 years. When Mel first started buying the land, in the 1940s, it had been cut over and only had around 15 cords to the acre. He now has around 600 acres of forest. After decades of cutting, most stands now have 20-30 cords to the acre, with some averaging 35-40 cords and other stands (with pine) having more than 50 cords to the acre. His growth rates are now a multiple of the state average. The proceeds from his cutting helped Mel and Betty raise eight children.

Mel got his forestry training at nearby Foxcroft Academy. The Academy was inspired by Maine forester Austin Cary to advocate sustained yield, rather than cut-and-run forestry. When he graduated in 1946, Mel started buying up woodlots and managing them based on what he learned, and as time went on, based on his experience.

Mel does not have rigid, long-term management plans. He cuts trees because there is a market and he wants to make money. But he has an inner sense about how to cut. He waits until trees have their highest values. He keeps stands well spaced for optimal growth. He ensures the stands are stocked with quality trees. He works with the species that are growing. If the stand is early successional, with a poplar overstory and a fir understory, that is what he grows. When he is cutting bigger trees, he sometimes thins adjacent saplings if they are crowded.

Because he works with succession and keeps full stocking, he is creating more late-successional habitat. He has pine martens living in his woodlot and birds that need interior forest.

Mel does not impose harvesting systems to stands. He cuts in a way that leaves a forest stocked with good quality trees. When he is done (usually he removes around 25-30% of the trees), you could label it "selection," "irregular shelterwood," or some other silvicultural system, but that "system" is a response to the stand conditions.

His woods technology began with horses, then jitterbugs, crawlers, bombadiers, a tracked skidder, and now a small skidder (John Deere 440). He does minimal damage to stands with cable winching and skidding the logs out. Sometimes he forwards shorter-length wood with a trailer. He and his son Russ are careful in the woods because it is obvious to them that damaging residual trees is destroying future value. They are now cutting high-quality sawlogs and veneer that Mel had tended over many decades. They can see the results. Mel jokingly says that well-managed forests can beat blue-chip stocks for returns.

to more than pay for the cuts, the answer is easy: “yes.” Indeed, it would be poor judgment to damage such a stand with heavy-handed cutting practices.

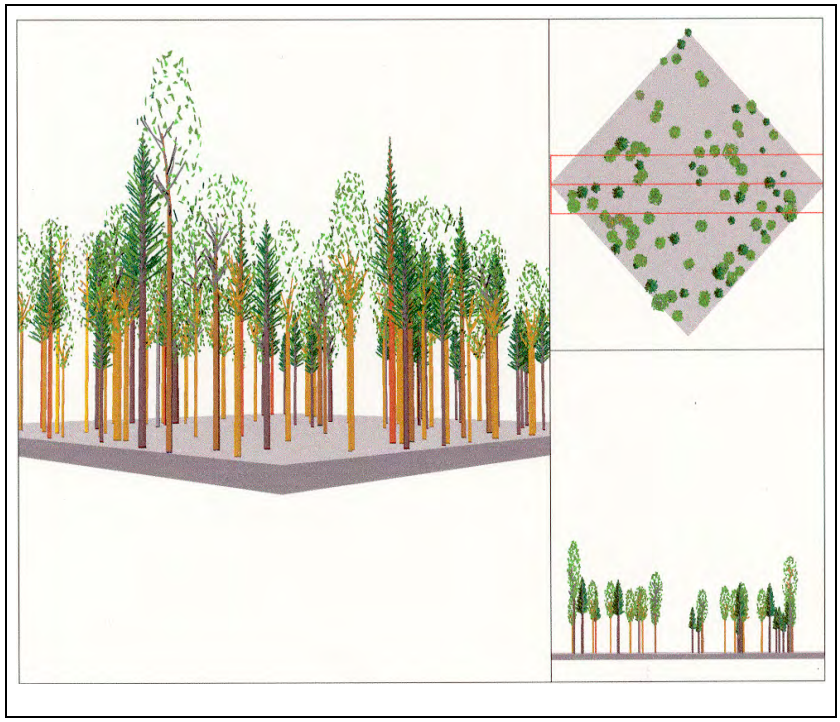
If “here” is a stand that has been repeatedly highgraded and is dominated by low-quality wood, “there” will take a long time, and may require some “investment cuts” that pay poorly, if at all. The long wait and the need for “investment” cuts is the penalty to be paid for previous mismanagement. Those landowners who did the previous cuts probably thought that what they were doing was economically sound. But they were not accounting for the costs to those who had to make the next cut. They were doing forestry as if the future did not matter.

If “here” is a stand on poor soils, with difficult terrain, poor accessibility, and short-lived, low-value species, the answer can be: “no.” The stand may not be worth managing for timber. It may be more valuable to protect the soil or water or for wildlife habitat.

Government policies. In some cases, government programs, such as those that subsidize timber stand improvement, can improve the economics of “investment cuts.” Foresters are generally knowledgeable about the existence of such programs.

Government policies, however, can lead to “perverse subsidies” that hurt the economy in general as well as the forest. Policies such as direct payments, lax environmental standards, lax labor standards, allowance of market domination, or pork-barrel tax breaks, can, in some cases, distort investments towards inefficient directions. Artificially cheap commodities can lead to waste and overuse. For woodlot owners, low mill-delivered prices, due to domination of markets by a small handful of players (oligopsony), makes getting good returns on forest practices more difficult. Rather than remedy this inequality by subsidizing woodlot owners, a better remedy would be more fair prices, which would help out both woodlot owners and loggers.

Computer models. Computer models are useful tools in making decisions on what is manageable and what kind of returns one can expect. With some models, such as FIBER (from the US Forest Service) one can program in cruise data to see what the stocking, volume, and value of the stand are. One can then program in a management system and get predictions of future growth, species ratios, product mixes, and values.



Graphics generated by FIBER FLEX computer model

Models do have limitations. They cannot predict:

- changes in the economy--including markets and prices;

- wind, ice, droughts, insect outbreaks, or climate change;
- the impacts of trail and yard distribution, or the impact of residual damage to future growth and quality;
- political shenanigans, wars, depressions, cartels, globalization, terrorism, or social turmoil...

  The world continues in the simplified computer model without serious disruptions--which is abnormal in the long run. But the models can be a useful tool, nonetheless, in visualizing possible consequences of various management approaches to a given stand and deciding if management makes silvicultural or economic sense.

Forestry associations. Forestry associations[1] can improve the economics of woodlot management a number of ways:

- Educate landowners, loggers, and foresters-- through literature, workshops, demonstrations, and trainings--to do more efficient management practices and marketing;
- Give referrals for good quality foresters and loggers;
- Help with pre-and post-logging assessments to determine level of stand damage;
- Set up concentration yards so that wood can be sold in more viable quantities;
- Establish cooperatively-run mills so that landowners can make money from kiln-dried lumber, rather than just stumpage;
- Establish logger associations so that loggers can save money using combined equipment, improved marketing, and improved techniques;
- Find higher-paying markets--including marketing certified wood.

Other considerations. The economics of logging are affected by more than just the management and the marketing.[2] The answers to the following questions can sometimes make a big difference in economic outcomes:

- How are deeds set up?
- How is forestry financed?
- What accounting procedures are used (such as net Present Value, Internal Rate of Return, Managed Forest Value, dollars per acre per year, etc.)?
- What discount rate is used? (if the investment is multi-generational, does it make sense to use a high discount rate to determine present value?)
- How are contracts set up?
- How are taxes paid?
- What has been done for effective estate planning?

Sustainable? One low-impact cut does not mean forestry is sustainable. It does keep options open for forestry to be sustainable, but there is no guarantee that the land will not be liquidated later. This issue can be addressed in a number of ways:[3]

- deed restrictions,
- easements,

---

[1] See section on establishing woodlot owners' associations

[2] See section on legal aspects of owning woodlands.

[3] See *Conservation Options: a guide for Maine landowners*, by Maine Coast Heritage Trust, Northeast Harbor, ME

- land trusts,
- forest banks,
- public land,
- public policy (research, demonstration, outreach, education, tax policy, regulations, etc.), and
- a strong conservation ethic.

A strong conservation ethic that is passed on through the generations is the most important item on the list. What protections one lawyer can put together, another can take apart. It takes a strong conservation ethic to prevent the current generation from taking the gold mine and leaving future generations the shaft.

Indeed, the key to the economics of low-impact forestry is that the benefits of actions taken today are going to more than this generation. As Wendell Berry wrote in his essay, "Conserving Forest Communities":

"The ideal of the industrial economy is to shorten as much as possible the interval separating investment and payoff; it wants to make things fast, especially money. But even the slightest acquaintance with the vital statistics of trees places us in another kind of world. A forest makes things slowly; a good forest economy would therefore be a patient economy. It would be an unselfish one, for good foresters must always look towards harvests that they will not live to reap."

*****

New Economic Analysis Tool for Woodlot Owner

Brooks Mills, a Maine woodlot manager, and Neil Lamson, forester for the State of Vermont, have created a spreadsheet program that can help woodlot owners calculate the economic benefits of growing quality timber.[4] The Brooks and Neil Tree Investment Chart (BAN-TIC)[5] uses information about grade (based on number of clear faces), volume, growth rates, and prices to project volumes, value, and rates of return over time of individual trees 10-30 inches DBH. With the program, users can calculate financial maturity of a given tree as well as the value of investing in management to improve growth rates or quality. It can also be used to calculate stand values.

The program demonstrates why it is a good idea to identify "crop trees," trees worthy of special attention and culture. It also demonstrates why landowners could benefit from growing these crop trees to larger diameters, rather than cut trees as soon as they reach sawlog size. The program assumes two 10-foot logs per tree. As the diameter increases from pulpwood to sawlog, and from sawlog to veneer sizes, the tree's values increase dramatically. Given a better grade of sawlog, annual returns from letting a tree grow can outpace most conservative investments even with trees up to 26 inches in diameter.

Brooks emphasizes that the really important thing that landowners can do is "to mark and number these high-value trees when they are 12-14 inches dbh and find out how they are doing and follow their development." In some cases, thinnings can help maintain tree vigor and lead to higher rates of increase in value. These measurements can also help the landowner spot when tree vigor is low and help in making the decision to cut before the tree goes down in value. Poor vigor in maple or ash, for example, can cause the dark heartwood to expand and lower the grade from veneer to sawlog.

The benefits of growing larger, higher-quality trees are even greater than shown in the chart for a number of reasons:

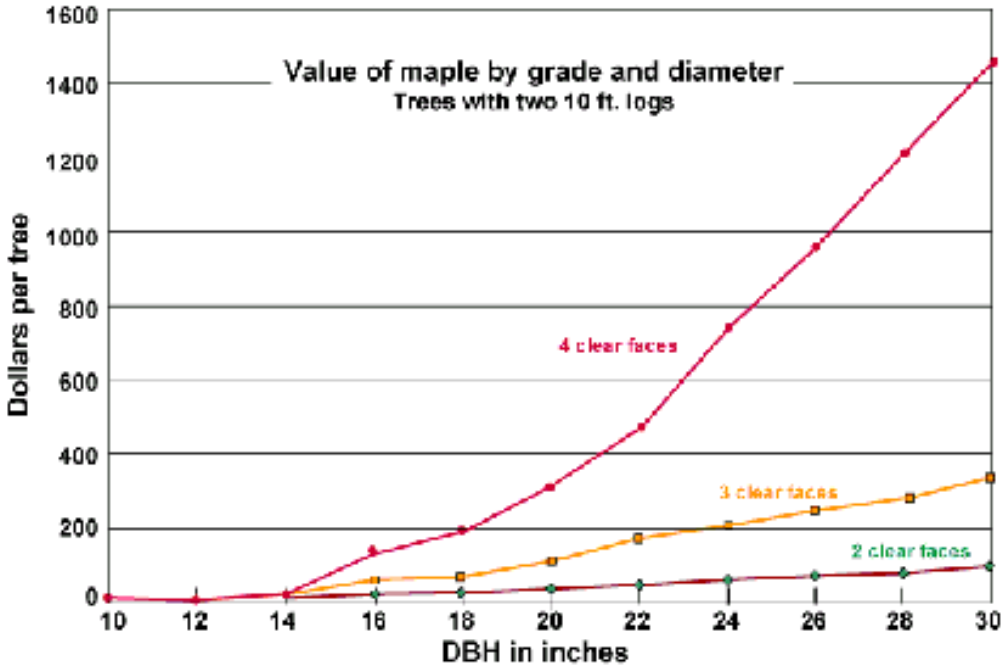
---

[4] For an example of the spreadsheet, see appendix IV

[5] For a copy call SWOAM office at 1-877-467-9626

- For high quality timber, mill-delivered and stumpage prices have been increasing at a rate faster than inflation. This increase is not accounted for in the program.
- Larger trees can sometimes produce longer high-quality logs.
- Rate of return is not necessarily the best way to calculate the value of letting trees grow.

Instead of looking at the rate of return (in percentages), a landowner can look at the dollar value increase per year per tree (or per acre). Annual increase in dollar value for 28 inch trees growing 2 inches is greater than that for 14 inch trees, even though the rate of return is far greater for the smaller trees. For example, a tree yielding two 10-foot logs with four good faces growing from 14 to 16 inches yields a 36% annual rate of return, but going from 28 to 30 inches yields only a 2.7% annual return given a growth rate of 7 years to increase 2 inches in diameter. The dollar value change, however, is $122 dollars for the 14 to16-inch increase, but $255 dollars for the 28 to 30-inch shift.



An individual tree is not an investment. You can not buy a 10-inch tree to plant on your land. It takes many decades to replace such a tree. Since larger trees put on more value per year than smaller-diameter trees, it does not make much sense to cut the trees when small and grow another small tree to take its place. It makes even less sense to damage a potential crop tree, lowering its growth rate or lowering its grade, which is why low-impact logging is so important for growing quality over the long term.

While landowners can use such charts to calculate the financial maturity of a tree, landowners might also be concerned with the biological maturity of a tree. The biological value also tends to increase with size. Growing trees past "financial maturity" can still yield better returns than cutting trees well before their prime, unless holding the trees longer would lead to rot or staining that would lower the grade.