

# Forestry Reform Network Project

## Issue Paper #2

### Economics & Private Forest Management

This is the second in a series of four papers establishing the basis for a dialogue of diverse interests around the economic and regulatory underpinnings of private industrial forestry. The result of this dialogue will be the formation of a Forestry Reform Network (FRN) capable of initiating policy solutions to improve coastal forest conditions. This paper will:

1. Describe forestry's grounding in economics.
2. Describe discounting and net present value management.
3. Explore the controversy over discounting and the need to move away from a strict return-on-equity approach to forest management.
4. State the need for new investment approaches to forestry that recognize social and biological values.

#### Introduction

Quality and quantity of ecosystem services, production of quality timber outputs, and job opportunities important to the vitality of local communities are not priorities for today's industrial forest owners. It is important to remind ourselves of what actually determines forest practices. The normal business goal of profit maximization drives private Coast Range forest management. This translates into short harvest rotations and silvicultural practices designed to maximize short-term profits. Private forestry's singular emphasis on economic efficiency occurs with far-reaching consequences for the silviculture practiced and the range of potential goods and services available from the forested landscape. It is important to understand that profit maximization is not about profits per se, but rather about achieving the greatest amount of profit relative to the amount of capital invested. Therefore, **return on equity** is the actual goal of forest-growing firms.

Competition for investment dollars within financial markets requires that industrial forest companies continually demonstrate that their long-term profit from investments is equal to or greater than that of other alternative uses of capital. To compare the relative value of various investment projects in consistent terms, managers "discount" projected profits by a rate of interest (profit) expected to apply to their alternative opportunities. This ordinary business practice of **discounting** places a huge burden on foresters to justify the wisdom of their silvicultural strategy.

For discussion purposes, the Forestry Reform Network Project assumes that the primary driver of industrial forestry is the economics of forest management for rate of return on capital and the subsequent use of a discount rate by timber firms when considering forest investments and silvicultural strategies. Forestry is an inherently capital-intensive enterprise. Because of return-on-equity considerations relative to competitive investment opportunities, forest owners face intense pressures to limit their long-term investments in forest capital.

We believe the notion that return-on-equity drives forest management is well understood by practicing foresters and is reflected in the silvicultural systems adopted and in the current landscape condition. Moving landscape conditions toward more natural historic conditions will occur because many political interests see value in doing so. The Forestry Reform Network seeks to connect the many dots of multiple values and interests and address the problem of forestry's profitability through the social investment in natural forest capital. As a final outcome, however, forestry reform involves the adoption of new silvicultural systems and land management objectives.

Financial markets driving the practice of forestry to an unsatisfactory condition has not gone unnoticed in scientific and academic communities. Katheryn Kohm and Jerry Franklin in their book, *Creating a Forestry for the 21<sup>st</sup> Century* state, "there is no technical area more central to forestry than silviculture: It is where the natural sciences, engineering, and management objectives [return on equity] converge and are hopefully successfully integrated." Kohm and Franklin go on to identify three pressing issues facing the practice of forestry: long rotations, structural retention and structural restoration. All three issues speak to the issue of forest capital and its rate of profitability.

*Issue Paper #2* seeks to remind network participants of the salient, driving connection of forest economics to landscape conditions. In order to increase the production of social and biological values from private forests through longer harvest rotations and a landscape approach to management, it is essential to devise instruments of public policy that increase substantially the forest (natural) capital.

## Forestry & Financial Markets

Peter Pearse in his book, *Introduction to Forestry Economics*, highlights the particularly close relationship of forestry to economics with the following (emphasis added):

*"The special characteristics of forest resources, which justify forest economics as a special field of study, can be summarized as follows:*

*"Forests can produce a wide variety of goods and services and combinations of them, some of which are not priced in markets. This gives rise to special problems relating to the allocation of resources among uses.*

*"Timber is an unusually slow-growing crop, often involving investment periods of many decades. This gives rise to **special problems in analyzing investments, harvesting schedules**, risks in carrying forest crops over long periods, and market uncertainty. It also means that forests can be altered only slowly in response to changed economic conditions.*

*"Forestry usually involves **very high capital and carrying costs relative to production** because the slow rate of forest growth means that large forest inventories must be carried to sustain a modest harvest. As a result, the costs of forest production are often dominated by **the burden of carrying land and capital over time.***

*"Forests valued for industrial timber are both productive capital and product. This fact distinguishes forests from other forms of capital and gives rise to special analytical problems in selecting the best age to harvest and in designing taxes and regulations."*

Pearse concludes; “*especially important problems of the field forest economics, [are] the theory of production, and especially the theory of capital and rent*” (Pearse, 1990).” We quote Pearse to establish that a **capital intensiveness** and a long production period are special problems in forestry. The fact that all financial investment capital has a market cost in alternative opportunities directly impacts rotation time and thus landscape condition.

## A Brief History

The vast old-growth forests granted to timber industrialists by the U.S. government in the 1800s and early 1900s brought enormous amounts of timber to companies supplying lumber to a young, expanding nation. Nature’s wealth was made available to timber companies. Over a period of several hundred years, the Northwest’s wealth of natural forest capital was drawn down through primary forest liquidation. As the supply of native forest began to run out after World War II, a thirty-five year process of establishing plantation forests based on invested capital began. Eventually, an equilibrium was established between the profit in wood products and the amount of forest capital available to produce that profit. That equilibrium determines today’s private forest landscape.

During the post-WWII transition, market forces asserted their power. In the FRN Project area, this meant that timber companies had to increasingly invest cash outlays in forest regeneration, road maintenance, forest protection and silvicultural treatments to optimize tree growth. Cash investments in forest regeneration replaced low-cost, native-forest capital. Today, without the competitive advantage of cheap abundant old-growth forests, timber companies not only compete in product markets they compete in capital markets for investment funds.

By the early 1970s, changes in the structure of international finance liberalized the flow of capital around the globe, further intensifying the competitive pressure for investment dollars. Deregulation of domestic markets and financial services added to the performance pressures facing all large business enterprises. In today’s world of globalized capital markets, investment money is drawn to the sources of greatest profit and maximum return to investors. All large firms, especially publicly held firms, are a reflection of global market forces for capital. Many of today’s Fortune 500 companies increasingly outsource capital-intensive factors of production to keep their assets yielding the highest rate of return.

From 1980 to 2000, the combination of deep structural changes in business and finance, coupled with the transition to investment-based plantation silviculture, resulted in a sweeping change for the forest products industry. Unfortunately, forests have not fared well under the global regime of capital investment and finance. As presented in *Issue Paper #1*, the structure and composition of Northwest private forests is severely and detrimentally altered from its natural reference conditions.

Market forces have not only impacted natural ecosystem processes they have created huge detrimental impacts to communities and rural livelihoods. Over the past several decades, the nature of the wood products industry has changed as saw-timber products gave way to fiber-based structural components. Competitive market pressures for capital have resulted in rotation times considerably shorter than the cumulative mean annual increment for saw-timber production. The

forest industry now grows for cubic volume not scribner volume. In response, the wood products industry has shifted to technologies that utilize smaller diameter logs and manufactured wood products, such as wafer and particle board.

While processing technology has effectively responded to short rotation times, other values have suffered. Under intensive short-rotation forestry, watershed values have declined, particularly with respect to native salmon populations and water quality.

## Forestry Economics

Silviculture is an intervention in the forest ecosystem intended to modify the yield of woody species in a desired way. From an economic viewpoint, this means making and implementing a set of interrelated investment decisions (Duerr, 1993: pg. 129). In simple terms, managers must answer a range of questions regarding when and what species of tree to plant, tree-spacing, use of chemical inputs, thinning treatments, and timing of harvest to optimize return on investment. In private Coast Range forests, the market conditions described above have led to an increasingly simplified and uniform pattern of silviculture. The uniform forestry practiced by Northwest private timber firms include:

- Clearcut harvest followed by natural or manual regeneration (site-prep and planting);
- Stand management to maximize the rate of tree growth (fertilization, herbicide application, and in some cases thinning);
- Output of harvest products (log grades), and processing of wood products based on the opportunities afforded by the log grades produced; and
- Construction and maintenance of a logging road system suitable to intensive, frequent-entry management.

Forest industry managers are understandably focused on determining what combination of actions will yield the most efficient allocation of their firm's resources. Given the regulatory framework operating over today's business environment, not much else should be expected. Forestry therefore is an exercise in **predicting** the costs and revenues associated with different management decisions over time, to arrive at a financially optimal rotation length. William Duerr points out in his *Introduction to Forest Resource Economics*, "In silviculture, decision-making is best undertaken in reverse chronological order. When some hypothesis about end uses has been formulated, the desirable rotation length can be considered for each species suitable with that use" (Duerr, 1993: pg. 131).

Duerr is pointing out the need to work back from the moment of timber harvest and the receipt of sales revenues. Investing today for a sellable product thirty to forty years down the road is extremely rare in today's business environment. Forestry is an unusual business proposition. Calculating the worth today of logs sold thirty years from now requires the reverse chronological perspective spoken to by Duerr. Determining today's cash value of a project's future net profit is done by calculating its **net present value**, which is arrived at through the use of an assumed **discount (interest) rate**.

## Discounting and Net Present Value

In the 1930's the great American economist, Harold Hotelling (1895-1973), developed a model of efficient resource use over time that explored the basis for discounting in today's forestry. He reasoned that a resource owner (or investor) faces a choice of whether to extract the resource and put the profits in the bank to earn interest at market rates; or leave the resource undeveloped to appreciate in value. The owner will only choose the second option if doing so will earn more than he can earn by liquidating the resource and placing the money in the bank.

According to Hotelling's logic "Any species or ecosystem that cannot be managed at a level such that it is generating a flow of services at a rate greater than the rate of interest 'should' be depleted" (Costanza, et al., 1997). That is exactly what we observe in the private forests of the Coast Range and Puget Lowland. Yet, the economic logic Hotelling describes is one of self-interest, either the self-interest of the firm or the individual. Hotelling was not describing a logic of economic efficiency applicable to communities, government, or society.

Long-living forests are a natural capital capable of providing abundant and often non-monetized amenities, goods and ecosystem services (optimal volume productivity, quality wood products, jobs, clean air and water, biological diversity, etc.). If Hotelling's logic were applied to all forests, such accumulation of natural capital would not be allowed. Conversely, we infer that any accumulation of natural forest capital on private land represents an investment in forest equity.

Calculations of "net present value" (NPV) are derived from predictions of future profits based on certain assumptions about the expected harvest volume and log grades multiplied by the expected market price, less the projected costs for management and inputs. This net profit is then discounted by an interest rate back to today's value. Thus, at an interest (discount) rate of 10 percent, the present value of \$1,000 profit from selling logs 25 years from now is worth only \$92.50 ( $\$1000 \times .9^{25}$ ). Therefore, a forest manager would not spend more than \$92.50 today on a forestry project that will pay off \$1,000 in twenty-five years. Business calculations of net present value are not peculiar to forestry; all large businesses calculate net present value to assess investment decisions.

One may ask how does a business decide on the correct interest rate to apply? The answer to this is not simple. At the very least, if nothing else were considered, **a business proposition must beat the compound interest offered by a bank on savings**. Here is where the problem of discounting and forestry comes in. We all know that savings that are allowed to compound over a long period of time will balloon in value. The higher the rate of interest, the faster the savings will balloon. If forests have to compete against the relentless build-up of value through compound interest, even with a low interest rate, there will inevitably come a time when the forest loses the growth race. Unfortunately, the point at which Northwest forests lose their race with compound interest is considerably before the age of the forest's natural reference condition.

## The Controversy of Discounting in Forestry

Not surprisingly, in academia and public policy there is a growing and persistent controversy over net present value analysis and the use of discounting. The issue is one of scale (individual, firm, community, government, society) and the subject being discounted (i.e. a steel mill or forest). A

growing body of academic work is revealing the error of applying discount rate/net present value analysis to entities such as forests (Norgaard, 1991; Kula, 1999). The error occurs when one confuses the interests of an individual economic actor with those of society as a whole. We urge all FRN participants to read Richard Norgaard and Richard Howarth's, *Sustainability and Discounting the Future in Ecological Economics, The Science and Management of Sustainability* (1991).

Norgaard and Howarth demonstrate that while net present value analysis and discounting have a role in public policy and business, the assumed rate is derivative of the overall analysis of intergenerational efficiency and equity. We quote Norgaard and Howarth (emphasis added):

“Though high interest rates discourage the long term management of slow growing resources (**forests**) and the protection of long term environmental assets (biodiversity), high interest rates also discourage investment in projects which transform environments (dams) and in projects which are necessary to extract resources (oil wells). Thus, the relationship between interest rates and conservation (protecting the interests of future generations), and sustainable development is ambiguous.

We show that the conservationist's dilemma results from a misspecification of the problem. Economists heretofore have not distinguished between decisions concerning the efficient use of this generation's resources and decisions concerning the reassignment of resource rights to future generations. **All decisions over time have been simply treated by economists as investment questions, as if all resources were always this generation's resources.** We properly specify the economic questions involved, clearly distinguishing between **equity and efficiency**, and show why discounting is appropriate with respect to the efficient use of this generation's resources but is inappropriate when this generation is primarily concerned with redistributing resource rights to future generations. Further, we show that when rights are reassigned between generations, interest rates themselves change. We conclude that the assignment of rights to the future is the instrument of conservation and sustainability; **interest rates are derivative.**”

While discounting may be ambiguous for some natural resource issues, it is not ambiguous for forests. Time and again in our research, forestry is offered as the **case example** where discounting engenders great unease. In response to the discounting controversy, the concept of a “social discount rate” has been suggested. The idea of a social discount rate acknowledges that different entities (e.g., a business firm in contrast to society as a whole) have different interests.

Colin Price in his 1993 book, *Time, Discounting and the Future*, grapples in-depth with the discounting issue. Price states:

“Over the years economists have expressed unease about the results and philosophical foundations of discounting. They have recognized that discounting is so firmly entrenched that it cannot easily be displaced. There is great institutional convenience in uniform adoption of a standard of appraisal: it seems to offer consistency, even if only in the form of a consistent error” (Price, 1993).

The critiques of discounting in forestry have taken one of two forms. Some have suggested discounting should be abandoned altogether, while most reformists agree that additional criteria and measures are needed to compensate for its harmful effects. Price suggests that “abandoning

[discounting] threatens too uncomfortable and too uncompromising a departure from our present shameful indifference to the distant future” (Price, 1993).

The idea of sustainability has suggested a number of considerations for offsetting the effects of discounting. Instead of viewing sustainability as the ideological opposite of discounting, some sustainability advocates see sustainability as complementary to discounting. Whereas discounting assures efficient allocation of investments, sustainability assures intergenerational equity.

The sustainability argument, based on the Brundtland Commission’s widely cited definition of sustainability, often starts on a strong note, but can easily slide into questionable approaches to justify environmental degradation. Pezzey (1989) delineates the constituents of sustainability—non-declining utility and non-declining (natural) capital stock—as helpful criteria. Duerr suggests these “offer useful insights into what kinds of process threaten sustainability, and what kinds of governmental or global intervention might avert such threats” (Duerr, 1993).

In all fairness, many contemporary Northwest economists, foresters, and public interest advocates have questioned in recent years the wisdom of discounting the future benefits from Northwest forests, especially when considering the social implications of Northwest forestry. Many have suggested that a proper social rate of return would be much lower than the market rate, given that many present costs and future benefits cannot be measured in dollars. A number of approaches have been suggested to abandon or modify the process of discounting, to account the full costs and benefits of management decisions, and to ensure that future generations will be able to meet their needs.

## The Significance of Discounting in Forestry

Several years ago a delegation of Cannon Beach citizens sought advice from the CEO of a Washington based industrial timber company. They were concerned about the management of the city’s watershed, which at the time was 95percent owned by a British firm, Cavenham Industries. They wanted to know what really made an industrial forest firm tick regarding its land management. To their surprise, the CEO told them, “two factors determine our forest management: public opinion and the discount rate.” That simple statement, the kind often found in the business press, spoke volumes about today’s forestry and the role of net present value management.

The citizen delegation from Cannon Beach was surprised that a singular management driver called “interest rate” determines forest management. Their surprise is understandable. Yet, a forest economist would have anticipated the CEO’s comment.

Returning to Price’s quote noting the institutional entrenchment of discounting brings us to the practice of forestry and the mindset of forestry professionals. We spoke to one Northwest forest researcher in silviculture who referred to net present value forest management as a “dogma.” Indeed, the university schools of forestry in Washington, Oregon and California have taught present net value investment analysis and the wisdom and necessity of discounting to generations of foresters. Our private forest landscapes now reflect that conventional wisdom.

## Additional Forest Business Problems

Forestry is inherently capital-intensive because of the length of time required to grow trees of merchantable size. Even on short rotations, forestry is a questionable investment because it depends on predictions far into the future of profits that are vulnerable to numerous uncertainties and risks. Routledge suggests that discounting criteria often “indicate that forests are not a sound investment at all, and that the appropriate treatment of a site is to deplete its fertility rapidly” (Duerr, 1993: pg. 329). An example of this is the conversion of forest land to residential and commercial development, which is happening rapidly throughout the Puget Lowland region.

Colin Price notes, “when one ponders the matter, one realizes that stock-holding costs in the forestry economy are enormous, almost beyond belief, and that therefore the rate of interest is the determinant of what emerges as the prime cost of forestry. This leading role of interest is created because forestry is such a capital-intensive industry” (Price, 1993: pg. 424). Any lengthening of forest rotations to provide a greater quality and quantity of social goods is profoundly uneconomic in the eyes of investors. This leads to two significant problems potentially facing the firm:

First, most timber company managers operate under the constraint of fiscal responsibility to company shareholders, and thus they cannot lengthen rotations. If managers violate this constraint, investors will replace them or sell their stock and put the money in some other investment with higher returns.

Second, a timber company with accumulated equity runs the risk of a hostile takeover by another company, which will then proceed to liquidate that equity and invest the proceeds in more efficient enterprises. The takeover of Pacific Lumber Company (CA) by the Maxxam Corporation is a prime example. Pacific Lumber held significant stands of old-growth redwood, and provided quality jobs with benefits, including a well-endowed pension fund for its employees. Maxxam sold junk bonds and took over PL, and proceeded to log nearly all the company’s old-growth holdings, liquidated the pension funds, and laid-off hundreds of employees.

## Investing In Natural Capital

At this point, it may be useful to stand back and realize that there are two sides to the problem of forest economics, and perhaps, shifting away from the technical controversies of discounting offers a way out. This is the strategy of the FRN Project. Return on investment, discount rate, rate of profit, and interest rate are all counterparts to investment capital. We acknowledge that private forest owners, be they firms or individuals, should expect a competitive rate of return on forest assets. Instead of fighting over how private owners and firms treat their private investment capital, perhaps a better question to ask is how private and public investors can cooperate with current forest land owners to create mixed equity projects? A mixed equity strategy would include projects where some equity will earn a market rate of return and some will not. This is precisely the outcome behind strategies to use forests for carbon sequestration to mitigate global warming.

Using a mixed equity investment strategy moves the debate away from arguing that private landowners should set their rate of return to a public standard. *Issue Paper #3* will explore the

opportunities afforded by a mixed equity investment strategy. Suffice it say that forests, like many business opportunities, are particularly suited to business propositions involving multiple partners with multiple objectives. A conservancy investment in a private working forest is a mixed equity partnership. While the forest's private managing partner gains a healthy return on his or her investment, the conservancy partner is essentially reinvesting in the forest as a gift to future generations. This is the kind of business thinking the FRN Project is about.

## Conclusion

Society's desire for the goods, services and amenities provided by long-living forests has created political pressure for companies to grow older forests. That political pressure is leveraged daily in the legal maneuverings between the environmental community and forest products industry.

Our assessment is that forestry reform strategies based on environmental law and regulation, while necessary, will not be sufficient to achieve adequate reform. If companies are compelled to harvest on longer rotations, the economic reality of capital cost will apply, and investors will either take their money elsewhere, or devote whatever resources necessary to protect their profits from a political "takings."

Legal and regulatory initiatives to reform private forestry in the FRN Project area will advance based on their political strengths and legal merits. This paper is meant to refresh our appreciation of the underlying economics of forestry, its capital intensiveness and how that fact influences forest management and public policy. Reforming forestry in the 21<sup>st</sup> Century, as Kohm and Franklin suggest, involves the restoration and protection of landscape-level forest structure. The Forestry Reform Network appreciates that fact and seeks a dialog to further the Network's understanding of forestry economics, achieve a clear forestry reform problem statement, and identify policy solutions.

We conclude that to increase forest structure and advance rotation time requires a social investment in natural forest capital. If society desires long-lived forests, we must devise economic and political instruments to provide investment capital that is not subject to the normal business constraints of net present value management and discounting.