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Forestland and Timber Donations: Challenging Management Opportunities for Foundations

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Over half of the forestland in the United States is in private hands. Just over 10 million individual and family owners control about 60% of this private forestland. Ownership of family forests changes on a regular basis; sometimes from generation to generation and sometimes to outside of the family. Often new owners are not interested in forest management and sell off the asset. Some owners attempt to ensure their family forest remains pristine and undeveloped. This is leading to timberland donations to entities that can be expected to hold the donated forest permanently and ensure sustainable forest management. University foundations and forestry schools are increasingly receiving timberland as donations. It is a way for donors to monetize the asset (with tax breaks) and protect it at the same time. Foundations have a problem with timberland as they often don't fully understand it as an investment. Certainly there are even times when a foundation should not accept it as a donation. The nature of timberland as an investment is explained, along with basic terminology that is common use. Age class distribution and the resulting cash flow distribution is explained, as well as timber volume, harvest scheduling, timberland investment analysis, timber value, timber sales, and timber contracts. All of these are tools foundation board members need to evaluate timberland donations.

Keywords: Foundation; University Foundation; Donation; Timberland Donation; Forestry Investment

Introduction

About 11 million private forest owners control 56 percent of the forest land in the United States (Butler, 2008). Nationally 10.4 million of these owners are classified as family forest owners (Butler, 2008). These are families, individuals, trusts, estates, family partnerships, and other nonincorporated groups of individuals that own forestland (Smith et al., 2009). These lands are changing hands at a rapid pace (Sampson & DeCoster, 2000; Kilgore et al., 2007).

Many family forest owners are seeking methods to gradually transfer natural resource-based assets to new owners who offer long-term protection to the natural values of the properties (Straka & Greene, 2002). Often forest land has been in a rural-based or agricultural family for generations and the family gradually loses it rural roots (Straka, 2011). There are limited options that can allow for some sort of monetary return, while ensuring protection of the property. Methods that allow the owner to capture some of the monetary value of the property, like tax-advantaged donations, are becoming popular (Greene et al., 2004).

At some point the younger generation would prefer to sell the timberland, or at least get some monetary return, rather than manage a family property (Kays et al., 1998). Other times the family might prefer to break a large holding into smaller holdings; for example, one equal smaller parcel for each sibling. This is called forest parcelization and it poses a societal problem if these smaller tracts are to be managed for sustainable forestry goals (Sampson & DeCoster, 2000). These smaller tracts lose "economies of scale" relative to forest management that can be practiced and often lose key attributes necessary for sustainability.

Family forest owners are actively seeking methods to retain some long-term level of family ownership, while avoiding forest parcelization (Butler, 2008). Forest land and timber are increasingly being donated to foundations as older donors look for tax-advantaged means to gradually transfer natural resource-based assets to new owners who offer long-term protection to the natural values of the properties (Zinkhan et al., 1992; Chung, 2012).

Land donations to foundations are common and management of land assets usually does not create a problem for foundation administrators. Often the intent is for some organization to retain perpetual ownership under some restrictions, but to allow timber harvesting to generate periodic revenue to sustain the property and pay for management. The timber resource, however, can increase the complexity of a land transaction and make a donation difficult to value (Fasano & Straka, 2009). Potentially, timber investments can produce negative cash flows for lengthy periods of time. These long-term sustainability and valuation issues can be difficult to address; acquisition of forestland requires a different set of tools for foundation decisionmakers (D'Amato et al., 2010). Few foundations are equipped to deal with forestland and timber assets, especially the on-going management responsibilities (Straka, 2009a).

Most foundation managers don't even understand the basics of forestry or timber. Properly managed, timber can be an attractive investment, especially if the investor understands the fundamentals of forest management (Straka, 2009b). We describe the basic financial underpinning of a timberland donation, including expected generation of cash flows, managerial complexity, and key factors to consider when valuing potential

timberland donations. A basic review of forestry and timber fundamentals is presented, including units of timber measurement. Timber sales and contracts are discussed as they are the source of cash flows. The importance of age-class distribution is discussed in terms of its impact on cash flows. Forests produce periodic timber harvests that equate to periodic cash flows. The "mechanics" of this process is described, as well as how the process can be manipulated to produce favorable cash flows. The importance of this material is that it can serve as a primer for foundation managers who are first evaluating a potential donation of forest land or timber.

Forestry Basics

A forest is an ecosystem consisting of an extensive tree cover. Foresters divide forests into stands; these are contiguous groups of trees that are similar in terms of age, species composition, structure, and that grow on a site of relatively uniform soil productivity. Stands are the basic management units used on the forest (Helms, 1998). For example, a stand usually receives management treatments as a unit; for example, all trees in a stand would be thinned or harvested at the same time.

Soil productivity in forestry, the quality of forestland to grow trees, is measured by site index. Site index always refers to a particular tree species, for example loblolly pine sites or white oak sites. Few species grow equally well on the same site. Specifically, site index is the average total height of the dominant trees in a forest stand at an index age.

Site index is usually based on an index age of 25, 50, or 100 years. In the American South the common index age is 50 years for natural pine stands and 25 years for pine plantations. If forestland has the capacity to grow dominant loblolly pines to an average height of 28 m in 50 years, it is classified as site index 28 land for loblolly pine, base age 50. Site index is important because of its dramatic impact on timber yield at harvest. **Table 1** shows loblolly pine yields by site index for a 20-year old pine plantation. The amount of pulpwood produced is over three and a half times as much on the higher site index land.

Because site quality has such a major effect on timber yield, it should be a key element in valuing any forest property. Higher site index land is worth more than lower site index land for timber production. If the forest is an investment and investment capital is limited, the highest site index portion of the forest should receive investment priority since this is the source of maximum timber production.

Yield is just that, what the forest yields in timber products (Stelzer, 2011). It is commonly measured in cubic meters per ha. In much of North America, pulpwood is often measured in cords and sawtimber in board feet. A cord is a stack of wood 122 cm (4 feet) wide, 122 cm (4 feet) high, and 244 cm (8 feet) long. This is a volume of 3.62 cubic meters (128 cubic feet). A board foot of lumber is 30.48 cm (1 foot) × 30.48 cm (1 foot) × 2.54 cm (1 inch). Weight is also commonly used as a measure of forest yield. There are other products like chip-n-saw (small timber that can produce some sawtimber, with the rest of the trees chipped for pulpwood) and large high quality logs suitable for plywood or poles.

Table 1.
Pulpwood yields for a 20-year old loblolly pine stand on Virginia's coastal plain with 1730 trees per ha at various site indexes (base age 25).

Site Index (meters)	Yield (tonnes per ha)
15.2 (50 feet)	136
18.3 (60 feet)	207
21.3 (70 feet)	317
24.4 (80 feet)	485

Tree size is measured as diameter 1.3 m (4.5 feet) above the ground, called diameter at breast height or DBH (Slusher, 1993; Oderwald, 2009). Trees are often grouped into 5 cm (2 inch) diameter classes, for example, a 25. 4 cm (10 inch) tree would vary from 22.9 cm (9 inches) to 27.9 cm (10.99 inches). Larger trees produce more valuable products and higher timber revenue. Pulpwood is commonly trees in size from 12.7 cm to 25.37 cm (5.0 to 9.99 inches), chip-n-saw is commonly 25.4 cm to 32.99 cm (10 to 12.99 inches), and sawtimber is 33 cm (13 inches) and above. Keep in mind the larger diameter products have significantly higher values. Pulpwood might be worth $10 per tonne on the stump, while chip-n-saw could be worth $25 per tonne, and sawtimber could be worth $35 per tonne. Poles and plywood quality sawtimber might be worth $45 per tonne.

A forest inventory is necessary to determine the timber volume on a tract (Johnson, 2009). It should list trees per ha by DBH classes. Further, the trees can be converted into timber volumes by product, leading to an estimate of total timber value. Basically, forest yield and stumpage price (price of timber on the stump) are the bases of defining the revenue expected from a timber sale. The forest yield is determined by site index, but is also greatly impacted by stocking.

Stocking is a measure of how many trees are in a forest stand relative to how many are needed to attain the best growth. There are two common measures of stocking: trees per ha and basal area. Basal area is the cross-sectional area of trees per ha at breast height, measured in square meters per ha. Or, in plain English, basal area is the square meter area of the top of all the tree stumps on an ha of land if all the trees are cut 1.3 m (4.5 feet) above the ground.

A forest stand should be fully stocked to get the best growth, not under-stocked or over-stocked (Blinn & Hendricks, 1997). Basal area is most commonly used to estimate adequate stocking. Trees per ha is a less reliable measure of stocking, unless you have an idea of tree size and how the trees are spaced in the stand. But it has the great advantage of being easily understood.

Stocking has little effect on total yield a forest if you are only interested in cubic meters or tonnes of wood produced. Stocking has a great impact, however, on the timber products available at harvest. You need a properly stocked stand to grow sawtimber. For example, for a 30-year old loblolly pine stand, stocking difference can account for over nearly five times more sawtimber from a stand. **Table 2** shows the amount of pulpwood and sawtimber that results from various stocking levels for this 30-year old loblolly pine stand. A forester will be needed to appraise stocking levels. Notice if you are just growing tonnes of wood, then stocking does not matter. But if you are growing quality timber products, then it is critical. Existing stocking will be a factor to consider when evaluating a timber investment or donation.

Age Class Distribution

For donated timberland a key determinant of value will be the age class distribution of the timber. Older timber usually

Table 2.
Pulpwood and sawtimber yields for a 30-year old loblolly pine stand on the Virginia coastal plain.

	Single Product	Multiple Products	
Trees/ha	All Pulpwood	Sawtimber	Pulpwood
	tonnes per ha		
1236	315.4	104.9	194.8
1483	316.1	77.6	223.0
1730	315.4	57.2	243.4
1977	312.9	41.9	257.8
2224	310.0	30.9	267.4
2471	310.0	22.6	273.5

equates to greater timber volume, plus a greater proportion of more-valuable timber products. Proper forest management ensures the optimum tree species for a site is regenerated and that stocking is controlled to produce optimum growth, both in volume and timber products. Forest stands may be thinned periodically, to generate timber revenue and to enhance stocking.

Consider the simple case of a natural loblolly stand in Virginia, as it becomes older, more and more of the timber volume becomes sawtimber. **Figure 1** illustrates this with real-world data. This illustration is for just pulpwood and sawtimber to keep the example simple. If chip-n-saw was included, much more of wood would be sawtimber; plus, poles and plywood-quality sawlogs would add more value if included. The difference is more pronounced if the illustration is viewed in terms of value. If pulpwood is valued at $8.82 per tonne and sawtimber at $33.07 per tonne, the comparison shows how much value is added by the sawtimber (**Figure 2**).

Thus, one of the first questions that should be asked about donated timberland is the age distribution of the stands. Where is the timber in terms of its growing cycle? Is it premerchantable timber, young timber about to become sawtimber, or mature timber ready for the market? How well was it managed for growth? Was it properly thinned when necessary? While the overall volume of timber per ha is relevant, the overall proportions of various timber products are even more important.

Cash Flow Distribution

The importance of the age class distribution is that is controls the cash flow distribution. Donated timberland property can have negative or positive annual cash flows. The age class distribution controls the sequence of thinning and harvest revenues. Often, in the absence of significant annual revenue sources (like hunting lease revenue; for example), annual cash flow can be negative. Consider the typical loblolly pine management regime in **Table 3**. The value of forestland managed under this management regime with these costs and revenues is $2470.95 per ha based on discounted cash flows over a perpetual time horizon at a 4% interest rate. This is called land expectation value (LEV) and the calculation follows. A single rotation of timber has a net present value (NPV) of $1544.06 per ha. That same value, considering the 4% interest, has a net future value (value at the end of the rotation) of $4116.21. Net future value equals $\$1544.06(1.04)^{25} = \$4116.21$ per ha. LEV (or bare land value) is equal to an infinite number of these rotations and has a NPV of $2470.95 per ha.

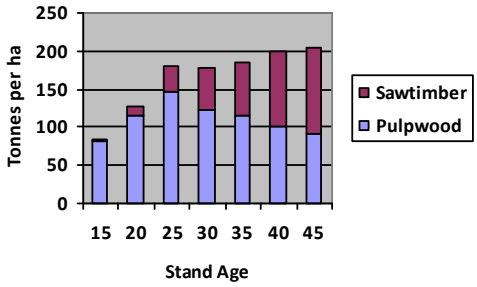

Figure 1.
Pulpwood and sawtimber yields for a natural loblolly pine stand on Virginia's coastal plain.

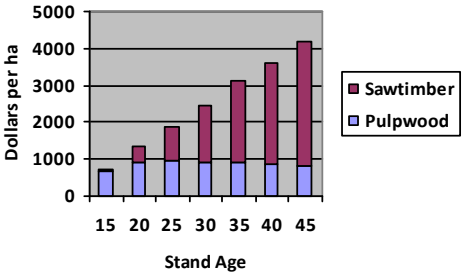

Figure 2.
Proportionate pulpwood and sawtimber value for a natural loblolly pine stand on Virginia's coastal plain.

Table 3.
Hypothetical timber management regime for loblolly pine with actual and discounted cash flows per ha at a 4% interest rate.

Year	Activity	Cash Flow	Discounted Cash Flow
0	Site prepare	–$494.21	–$494.21
1	Weed control	–185.33	–178.20
18	Thinning revenue	+741.32	+365.94
25	Harvest revenue	+5447.95	+2043.62
1 - 25	Annual cost	–12.36	–193.09
		NPV =	$1544.06

Several key characteristics of timberland investments control its cash flows (Bettinger et al., 2009). First, unless the forest is already established, there are usually potentially large initial costs. Site preparation, planting, herbaceous weed control, and fertilization occur early in the investment. Bare land will mean significant initial costs. Second, the age class structure, as already discussed, will control cash flows. If the age class structure is limited, potential revenue might be infrequent and delayed. Fortunately, forest yields from any age class distribution can be easily projected. Third, forestry investments tend to be long-term. A single timber rotation in the American South can range up to 35 or more years. In the American West the range can be 50 to 100 years. Of course, a forest can have many age classes.

Consider the cash flow generated by the management regime in **Table 3**. There are negative cash flows until the timber is thinned at year 18 and even then the cumulative cash flow considering interest is negative. However, at final harvest the major positive cash flow occurs, but that is at year 25. The cumulative cash flow considering interest at year 25 is $4116.20 (if the

planting and site preparation cost of the next rotation is included, it is $3621.99).

Table 4 and **Figures 3** to **6** illustrate the huge impact of age class distribution on donated timberland. Notice if the timberland is donated as bare land (needing site preparation and planting), it has a negative cumulative cash flow until the final harvest at age 25. This is the situation where LEV or bare land value is calculated and this bare land donation would have a value of $2470.95 per ha at 4% interest.

When more mature timber is donated, say 10-year old pre-merchantable timber, the negative cash flow is only for eight years and then the cumulative cash flow remains positive. If the donated timber was at the thinning age of 18-years old, then the cumulative cash flow is always positive. If a mature timber stand of age 25-years is donated, there is an immediate huge cash flow. Recall the age zero timber stand is worth $2470.95 per ha at 4% interest; the age 10-year timber stand would be worth $4788.98 per ha; the age 18-year timber stand would be worth $6672.50 per ha; and the age 25-years timber stand would be worth $7906.54 per ha (this is the immediate cash flow of $5435.59 plus the value of all the remaining rotations of $2470.95). **Figure 7** shows the donation value (LEV plus discounted value of existing stand) for all donation ages between 0 and 25 years.

Table 4.
Cumulative cash flows including 4% interest for a loblolly pine tract donated at ages 0, 10, 18, and 25 years.

	Annual	Cumulative Cash Flow Including Interest			
	Cash	Age 0	Age 10	Age 18	Age 25
	Year Flow	Donation	Donation	Donation	Donation
0	–$494.21	–$494.21			
1	–197.69	–711.67			
2	–12.36	–752.50			
3	–12.36	–794.96			
4	–12.36	–839.12			
5	–12.36	–885.04			
6	–12.36	–932.80			
7	–12.36	–982.47			
8	–12.36	–1034.13			
9	–12.36	–1087.86			
10	–12.36	–1143.73	–$12.36		
11	–12.36	–1201.84	–25.21		
12	–12.36	–1262.27	–38.58		
13	–12.36	–1325.12	–52.48		
14	–12.36	–1390.48	–66.94		
15	–12.36	–1458.46	–81.98		
16	–12.36	–1529.16	–97.62		
17	–12.36	–1602.69	–113.88		
18	+728.96	–937.84	+610.52	+$728.96	
19	–12.36	–987.71	+622.58	+745.76	
20	–12.36	–1039.58	+635.12	+763.23	
21	–12.36	–1093.52	+648.16	+781.40	
22	–12.36	–1149.62	+661.73	+800.30	
23	–12.36	–1207.96	+675.84	+819.95	
24	–12.36	–1268.64	+690.51	+840.39	
25	+5435.59	+4116.20	+6153.72	+6309.60	+$5435.59

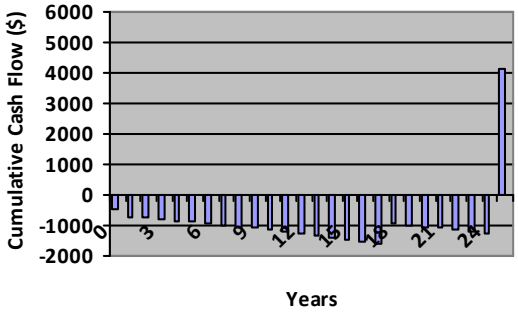

Figure 3.
Cumulative cash flow per ha for a donated loblolly pine forest at age 0, including interest.

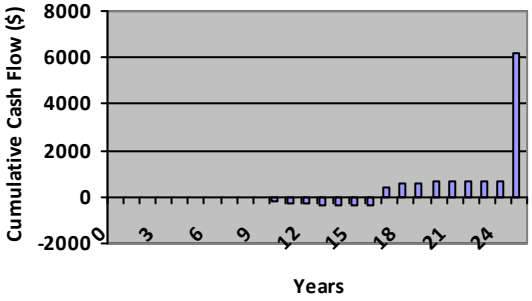

Figure 4.
Cumulative cash flow per ha for a donated loblolly pine forest at age 10, including interest.

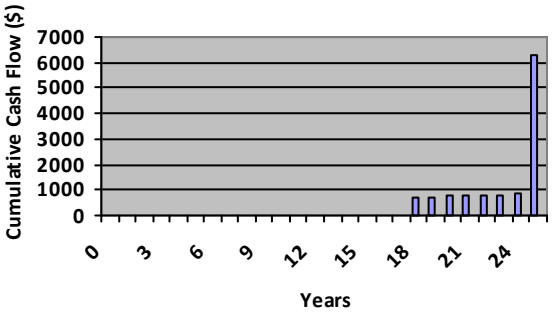

Figure 5.
Cumulative cash flow per ha for a donated loblolly pine forest at age 18, including interest.

Converting Cash Flow into Donation Value

A timberland investment or donation is evaluated just like any other investment or donation (Bullard & Straka, 1998). Consider the loblolly pine stand described in **Table 3**. The structure of the cash flows can be determined from the management regime and discounted cash flow analysis can be used to determine the standard financial criteria. The NPV of a single rotation is calculated in **Table 3** as $1544.06 and the internal rate of return (IRR) for this investment is 9.02%. Like NPV, IRR is calculated in the standard manner.

One interesting financial criterion used in forestry is equal annual income (Straka et al., 2001). The investment's NPV is multiplied by the formula to convert a single sum into an annual series to obtain the equivalent equal annual cash flow. Foresters sometimes use this criterion to compare timber investments with annual investments, like agricultural crops

Figure 6.
Cumulative cash flow per ha for a donated loblolly pine forest at age 25, including interest.

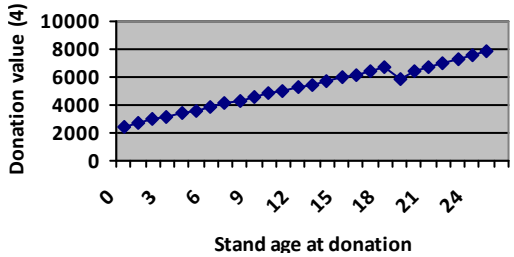

Figure 7.
Donation value of loblolly pine stand per ha for various stand ages, value of discounted remaining cash flow in rotation plus discounted land expectation value at 4% interest.

(Straka et al., 2002). For this example, equal annual income is $98.84 per ha. At a 4% discount rate, a cash flow of $98.84 per year for 25 years is equal to a single sum (or NPV) of $1544.06 at year 0. An equivalent positive annual cash flow of $98.84 per ha might seem reassuring, but keep in mind that this investment would have a negative cash flow for 23 of the 25 years.

Finally, LEV or bare land value is the NPV of an infinite number of timber rotations on a forested tract (Straka & Bullard, 1996). The criterion assumes the land is bare and the management regime will be repeated forever. The basic formula for the present value of a perpetual periodic cash flow series is used to calculate LEV (Klemperer, 1996). For the loblolly pine stand in **Table 3**, LEV is $2470.95 per ha. This is the value of a string of timber rotations based on **Table 1** that extends forever. This means if an investor paid $2470.95 per ha for bare land and grew timber according to **Table 1** forever, the rate of return earned on the investment would be 4%. This is because LEV is a type of NPV calculation and it was calculated using the same 4% interest rate as the example.

Donation value is calculated in each case from the data in **Table 4**. At each age the remaining cash flow is discounted for the years remaining in the rotation; added to this is LEV discounted for the same time period; the two combined add up to the donation value. For example, the cash flow from an age 25 donation is an immediate harvest value of $5435.59. The donor receives that harvest value plus has a perpetual flow of timber rotations (LEV) with a value of $2470.95. The donation value is the sum of the two or $7906.54 per ha.

If the donation was an 18-year old stand, the donor would have the cash flow in **Table 4** that has a future value in seven years of $6309.60. In seven years LEV would then be worth an additional $2470.95. So the donation value for an 18-year old stand is $8780.55, discounted for seven years at 4% interest, or $6672.50 per ha. Likewise a 10-year old stand would be worth $6153.72 plus $2470.95, both discounted for 15 years, or $4788.97 per ha. Finally, the 0-year old stand donation value would be worth $4116.20 plus $2470.95, both discounted for 25 years, or $2470.95 per ha. As we'd expect the donation value of a zero aged stand is LEV. Calculations for ages not in **Table 4** are performed in an identical manner using the expected cash flows.

Other Forestry Basics

Foundation administrators and board members should understand the basic terminology and management considerations of timberland investment alternatives (Slusher, 1990). Timber and timberland pose some unique management problems. Some of the basic ones are discussed below.

Many items not considered in an investment analysis influence timber values (Straka et al., 1985). For example, it is prudent for investors and owners to know how their timber is actually valued. There are two common types of timber prices: delivered and stumpage. Delivered is the price if you deliver the timber to a mill; stumpage price is for timber as it sits on the stump in the woods. Stumpage price is less than delivered price as someone has to harvest and transport stumpage to the mill. Other significant factors influencing the price offered for timber are discussed below.

Timber Volume

The owner expects to be paid for the amount of timber sold (Rickenbach, 2003). That is sometimes not as easy as it seems. Timber is sold lump sum and "per unit." With lump sum the owner sells the timber on a specific area or marked timber for a negotiated price and the buyer obtains ownership for whatever timber volume is actually there. A professional forester needs to perform a timber cruise to ensure the owner knows the volume being sold. With a per unit sale the owner receives periodic payment for the actual timber cut as it is delivered. That means the owner needs some sort of security to assure payment for all loads from the tract.

Is the timber properly merchandized (e.g., is there sawtimber in a load of pulpwood?). What unit is the wood measured in (cubic meters, tonnes, or some other measure)? In North America thousand board feet it used to measure sawlogs and various scales are used (there are many "log rules" and they vary). Is there a conversion between volumes? Sometimes volume measures are converted into weight measures for payment purposes. Some timber species are worth more than others. As average diameter increases on a tract, so should the price of the timber. Larger diameter logs have much greater lumber volumes and value; both size and quality contribute to this value. Even the length of the timber sale contract can impact timber

volume. If the seller allows the buyer a couple of years to get all the timber off the tract, and logging occurs at the end of the contract period, there would be two years of extra growth the seller never gets paid for if it were a lump sum sale.

Harvesting Costs

Timber value is based on the value of wood delivered to a processing facility, minus harvesting costs and transportation costs (Watson et al., 1986). The company that buys a tract of timber incurs costs (overhead cost of personnel and vehicles, timber cruising, biding, legal work, and the cost of unsuccessful bids). These costs are deducted from a bid. The largest cost deducted from log values is the actual cost of harvesting the timber, which is influenced by many factors. The type of harvest has a huge impact (a partial cut is much more expensive than a clearcut). Timber size and species also affect the costs of harvesting. On a per unit of volume basis, large timber is less is less expensive to harvest than small timber. Hardwood species require more time to delimb than do pines and are, therefore, more expensive to harvest.

Weather conditions directly influence harvesting costs. Wet weather probably increases harvesting costs more than any other single factor. Wet weather reduces skidder capacity and some owners ban logging during wet weather to minimize soil damage. Any sales restriction will result in lower timber prices. As mills can only stockpile so much timber to carry them through wet periods, tracts that can be efficiently logged in wet weather often earn premium timber prices.

The physical condition of a tract affects logging. Fragile soils require special care. Steep slopes also require special care and extra effort from machine operators. Access can add costs. Rights-of-way may need to be acquired and logging roads constructed. Any constraint on the logger adds costs (e.g., gas lines, power lines, and streams decrease productivity and increase hazard). Landowner restrictions on length of work day or work week, condition of fences, ponds, and logging roads, aesthetic barriers, or game habitat all increase harvesting costs.

Transportation Costs

Costs of moving loggers to and from various timber tracts can vary greatly. The distance that equipment must be moved to begin logging a tract and the number of machines to be moved affects total harvesting costs. As the amount of wood to be moved from a tract increases, however, the influence of moving costs is greatly reduced (the cost per unit of production goes down).

Transportation from the tract to the mill is another significant cost. Factors that influence this cost are distance to the mill on public roads, condition of public roads and bridges, urban areas between the tract and mill, and distance and condition of woods roads. Gross truck weight laws can also be a factor.

Forest owners need to be aware that stumpage price is derived from delivery value minus the costs of purchasing, harvesting, and hauling timber from a tract. Owners can control only a few of the factors, like contract restrictions. Sometimes fewer restrictions can produce both better timber prices and after-harvest tract conditions, as often it is cheaper for loggers to accomplish the desired results as part of the logging operation. Professional assistance is usually well worth the investment and can ensure timber sale security and top timber value.

Timber Sale Fundamentals

A timber harvest is not a single event, but should be part of the owner's management strategy and goals; it has huge silvicultural implications and impacts the future productivity of the tract (Straka & Watson, 1985). Unless the owner is well versed in timber sale requirements, a professional forester's services will likely be well worth the investment (Straka, 2010). If the forest is well managed, the owner will have a forest resource management plan and a supplemental timber harvest plan (Straka, 1997). For most forest owners, this is not a do-it-yourself project.

As a first step the property boundaries and timber sale boundaries need to be clearly marked. It is important that the trees to be cut are positively identified to eliminate the major problem of accidentally cutting on a neighbor's property. The contract should specify exactly which trees are to be cut and uncut in a partial sale. Adjacent neighbors should be contacted. It is simply polite and it could avoid a misunderstanding. Plus, then there would be other people in the area knowing what is going on, perhaps helping the owner keep tract of timber removed from the tract.

Second, the best timber price should be obtained and this means marketing the timber. This is a major reason a forester is recommended; they have the contacts and experience to best market timber. Many consider sealed bids to be a means to maximize timber price. Certainly, the better the marketing, the greater the number of bids, and that will produce the highest timber prices. Timber will be sold on a lump sum or per unit basis. Lump sum eliminates many timber security issues as there is no need to keep tract of timber (unless a partial sale is involved, then someone must see that no "extra" timber is cut).

The owner needs to know what the timber is worth. This seems too simple to mention, but many owners don't understand units of measure. Some timber species are worth much more than others. Average DBH of a tract will largely control price, but tree quality is another big factor.

Third, a timber contract is a must. On a per unit or pay-as-cut sale it can ensure the owner is paid on a regular basis. It can establish where logging roads will go, locations of logging decks, protection of sensitive areas, and ability to shut down operations in bad weather. There are dozens of other issues addressed in a good timber sale contract.

Fourth, the owner needs to be certain a quality logging firm will be operating on the property. There are many truly competent professional loggers and a few who are not. The owner will regret letting a "not" operate on his or her property. Best Management Practices (BMP's) could become an issue. BMP's are established practices that offer protection to your property and reduce soil erosion from harvesting operations. The forest owner is ultimately for voluntary BMP compliance. The choice of logger has a huge impact on what the finished job looks like (Watson & Straka, 1983).

Fifth, someone needs to monitor the timber sale. Only by regular visits can the owner or forester be certain contract provisions are being met. A good logger will have to interpret the contract to fit the many conditions on the tract. Sometimes the logger's interpretation differs from the owner's interpretation. Often the logger can suggest contract modifications that will increase profit.

Sixth, once the logging operation is complete, a final inspection should establish the tract has been left in the condition

specified in the contract. Does logging slash meet requirements? Have all marked trees been harvested and are all unmarked trees uncut? Are any erosion control practices in place? Even for a tract left in good condition, the owner will have erosion and water pollution concerns, as this is a time the tract is vulnerable. There are post-harvest BMP's that must be put into place. Of course, regeneration is often part of the post-harvest planning.

Timber Contract Fundamentals

Most forest owners harvest timber. Donated timber needs to be harvested periodically. The experience can vary from pleasant to catastrophic and often the difference is due to a well-written timber sale or timber deed contract (Clatterbuck & Tankersley, 2005).

A clearly-written, legally-binding contract should be the basis of all timber transactions (Straka & Watson, 1985). A document that can be recorded at the courthouse is best. Ideally, the owner will seek the advice of three professionals; an accountant, lawyer, and forester. A timber sale is often a large financial transaction and ought to be treated as such (Daniels et al., 2012). Four basic issues need to be resolved by the contract: the exact timber being sold, the terms and prices, restrictions on logging operations, and property protection measures. Below are specific considerations for any timber sale contract.

Who are the buyer and seller? Who actually owns the timber? Will the buyer and seller have agents or deal directly with each other? If the seller is an absentee landowner, who will represent him? Can the buyer assign rights? What is the length of the contract? What if the timber sale is incomplete at the termination date? Are extensions allowed and is there a cost? There would certainly be a cost to the seller due to delayed regeneration. Can the logging job be shut down during bad weather? Will the owner be notified when operation begins, is temporarily shut-down, and ends?

What is the legal description of the sale location and exactly what is being sold? Exactly what is being sold needs to be clearly defined. It can be just as important to define what is not being sold. Besides a formal legal description, a tract location map should be included, with property lines and sale boundaries. If there is a problem precisely defining the sale boundary, the owner should insist that a well-defined boundary be established. Exact, precise definitions of the trees being sold are an absolute necessity. What tree species are included and excluded. What trees sizes are to be cut and how will it be measured (if tree size is defined by DBH there will be no precise way to tell if a cut tree actually met the requirements; maybe measurement should occur on the stump portion of the tree)? Will the cut trees be marked? Flagging should never be used for marking; it is temporary. If paint is used, the owner should be certain that the stumps are also marked and that there are no way additional trees can be marked later. Trees grow; if cut trees are defined by DBH or merchantability, which date is used to establish if they are included in the sale? Is it the date of the contact or the date of harvest? What units of measure will be used?

What is the timber price and payment schedule? The timber price per unit can be tricky and is why a forester should be involved. Lump sum or per unit sales will mean different types of payment schedules. Will there be a down payment? Will there be a performance bond or security payment? This can ensure contract provisions are satisfied and can be used to ensure soil, water, and other resources are protected. All owners would want to require adequate insurance is in place and should be certain the contract places liability for the logging operation on the buyer. This is crucial as harvesting operations are dangerous.

Are BMP's to be followed and what if they are not? A harvest map ought to be part of any timber harvest plan and needs to include tract and sale boundaries, location of landings, stream crossings, logging roads, and any environmentally sensitive areas like wetlands or special wildlife habitats. What conditions does the owner expect the landings, stream crossings, and logging roads to be left in? Where will the buyer have access to the property and will it be limited in any way (gates)? Some owners are sensitive about logging slash and debris; and contract specifications can address this issue. Each restriction increases logging cost.

What if unmarked trees are cut or cutting occurs across a boundary? Penalties need to be explicit. What if timber is improperly merchandized (sawtimber included in a load of pulpwood on a per unit sale)? On a per unit sale, utilization standards are important. Both maximum stump height and top diameter need to be specified so that no usable wood is left in the woods.

Fire is sometimes an issue. The buyer should be required to follow all fire laws. What if the seller suffers injury due to a fire caused by the logging operation? What if the timber is destroyed mid-harvest by fire or hurricane? Arbitration is often specified in the contract to handle disagreements.

Timber sales represent an opportunity to have improvements made to the property (Bardon, 2011). Keep in mind the tract conditions at the end of a harvesting operation are the tract conditions at the beginning of the site preparation and regeneration operations. Perhaps the contract can include provisions to ensure the tract is left in shape to minimize the cost of regeneration. Gates could be added and roads lengthened. Maybe pre-commercial thinning could be accomplished on an adjacent stand while the equipment is nearby. Obviously, this would increase overall harvesting cost, but it might be the most cost-effective way to achieve these improvements.

Conclusion

Foundation managers can increasingly expect to obtain offers of donated forestland and timber properties. Often these assets come with "strings attached," like retaining the land in forest, expectations that the forestland will be retained in some sort of ownership on a perpetual basis, or limitations on timber harvesting. Forests and timber are complex investments and many financial managers are not well-versed in their management requirements. The forestry basics presented in this article should provide these managers the basic issues to address in terms of forestry basics, timber value, sales, and contracts. This represents the basics the manager needs to know prior to bringing a forestry professional into the discussion.

Any asset that can produce negative cash flows for long periods is one that foundation managers look at closely. The age class distribution controls cash flow for a forestry investment and the mechanics of how these cash flows can be determined should prove invaluable in making preliminary determinations on the value of forested properties. Certainly this basic forestry information can be found on the web and introductory forestry textbooks. However, the information summarized here is spe-

cifically addressed to foundations and donated forestland. That explains the emphasis on cash flows and timber security issues. Foundation managers will want this type of information in their files when called upon to exercise fiduciary responsibilities when donated forest land opportunities arise.

REFERENCES

Bardon, R. F. (2011). *Timber sales: A planning guide for landowners.* AG-640 (Revised). Raleigh, NC: North Carolina State University Cooperative Extension Service.

Bettinger, P., Boston, K., Siry, J. P., & Grebner, D. L. (2009). *Forest management and planning*. Burlington, MA: Academic Press.

Blinn, C. R., & Hendricks, L. T. (1997). *Marketing timber from the private woodland*. St. Paul, MN: University of Minnesota Extension.

Bullard, S. H., & Straka, T. J. (1998). *Basic concepts in forest valuation and investment analysis* (2nd ed.). Jackson, MS: Forestry Suppliers.

Butler, B. J. (2008). *Family forest owners of the United States, 2006*. Newtown Square, PA: USDA Forest Service, Northern Research Station.

Chung, H.-F. (2012). *Timberland investment: A primer*. Brookline, MA: Timberland Investment Resources LLC.

Clatterbuck, W. K., & Tankersley, L. (2005). *Landowner's guide to timber sale contracts.* Knoxville, TN: University of Tennessee Extension.

Daniels, B., McAvoy, D., & Kuhns, M. (2012). *Preparing a timber sale contract*. Logan, UT: Utah State University Cooperative Extension.

D'Amato, A. W., Catanzaro, P. F., Damery, D. T., Kittredge, D. B., & Ferrare, K. A. (2010). Are family forest owners facing a future in which forest management is not enough? *Journal of Forestry, 108,* 32-38.

Fasano, G. A., & Straka, T. J. (2009). Timberland investing for financial planning clients. *Journal of Financial Planning, 22,* 56-63.

Greene, J. L., Straka, T. J., & Dee, R. L. (2004). Non-industrial private forest owner use of federal income tax provisions. *Forest Products Journal, 54,* 59-66.

Helms, J. A. (Ed.) (1998). *The dictionary of forestry*. Bethesda, MD: The Society of American Foresters.

Johnson, J. E. (2009). *Forest landowner's guide to the measurement of timber and logs*. Blacksburg, VA: Virginia Cooperative Extension.

Kays, J. S., Goff, G. R., Smallidge, P. J., Grafton, W. N., & Parkhurst, J. A. (Eds.) (1998). N*atural resources income opportunities for private lands—Proceedings of the conference*. College Park, MD: University of Maryland Cooperative Extension Service.

Kilgore, M. A., Greene, J. L., Jacobson, M. G., Straka, T. J., & Daniels, S. E. (2007). The influence of financial incentive programs in promoting sustainable forestry on the nation's family forests. *Journal of Forestry, 105,* 184-191.

Klemperer, W. D. (1996). *Forest resource economics and finance*. New York, NY: McGraw-Hill, Inc.

Oderwald, R. G. (2009). *Measuring standing trees and logs.* Blacksburg, VA: Virginia Cooperative Extension.

Rickenbach, M. G. (2003). *Conducting a successful timber sale: A primer for landowners*. Madison, WI: University of Wisconsin-Extension.

Sampson, N., & DeCoster, L. (2000). Forest fragmentation: Implications for sustainable private forests. *Journal of Forestry, 98,* 4-8.

Slusher, J. P. (1990). *Forestry terms for the woodland owner*. Columbia, MO: University of Missouri Extension.

Slusher, J. P. (1993). *How to measure trees and logs*. Columbia, MO: University of Missouri Extension.

Smith, W. B., Miles, P. D., Perry, C. H., & Pugh, S. A. (2009). *Forest resources of the United States, 2007*. Washington, DC: USDA Forest Service, Washington Office.

Stelzer, H. E. (2011). *Selling timber: What the landowner needs to know*. Columbia, MO: University of Missouri Extension.

Straka, T. J. (1997). Forest management plans for small holdings. *Forest Landowner, 56,* 34-35, 38-39.

Straka, T. J. (2009a). Does your client own timberland? *Financial Advisor, 10,* 95-96.

Straka, T. J. (2009b). Forest products finances: Institutional investors. *Forest Products Equipment, 17,* 12-13, 21.

Straka, T. J. (2010). How to sell timber. *Forest Landowner, 69,* 30-32.

Straka, T. J. (2011). Taxonomic review of classical and current literature on the perennial American family forest problem. *Forests, 2,* 660-706. doi:10.3390/f2030660

Straka, T. J., & Bullard, S. H. (1996). Land expectation value calculation in timberland valuation. *Appraisal Journal, 64,* 399-405.

Straka, T. J., Bullard, S. H., & Dubois, M. R. (2001). Introduction to forestry investment analysis, part I: Basic investment characteristics and financial criteria. *Forest Landowner, 60,* 9-12, 14.

Straka, T. J., Bullard, S. H., & Dubois, M. R. (2002). Introduction to forestry investment analysis, part II: Taxes, inflation, and other issues. *Forest Landowner, 61,* 39-44.

Straka, T. J., Bullard, S. H., & Watson, W. F. (1985). Primer on forestry investment. *Forest Farmer, 45,* 10-11.

Straka, T. J., & Greene, J. L. (2002). Do your clients understand how taxes affect their timber investments? *The Consultant, 47,* 27-29.

Straka, T. J., & Watson, W. F. (1985). Avoiding ambiguities in timber sale agreements. *The Consultant, 30,* 29-31.

Watson, W. F., Bullard, S. H., & Straka, T. J. (1986). It pays to know how your timber will be valued. *Forest Farmer, 45,* 14-16.

Watson, W. F., & Straka, T. J. (1983). Match harvesting equipment and methods to your forest's conditions. *Forest Farmer, 42,* 6-7, 19.

Zinkhan, F. C., Sizemore, W. R., Mason, G. H., & Ebner, T. J. (1992). *Timberland investments: A portfolio perspective.* Portland, OR: Timber Press.