

**FORVAL for Windows:**  
**A Computer Program for FOrEst VALuation**  
**and Investment Analysis**

By

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and

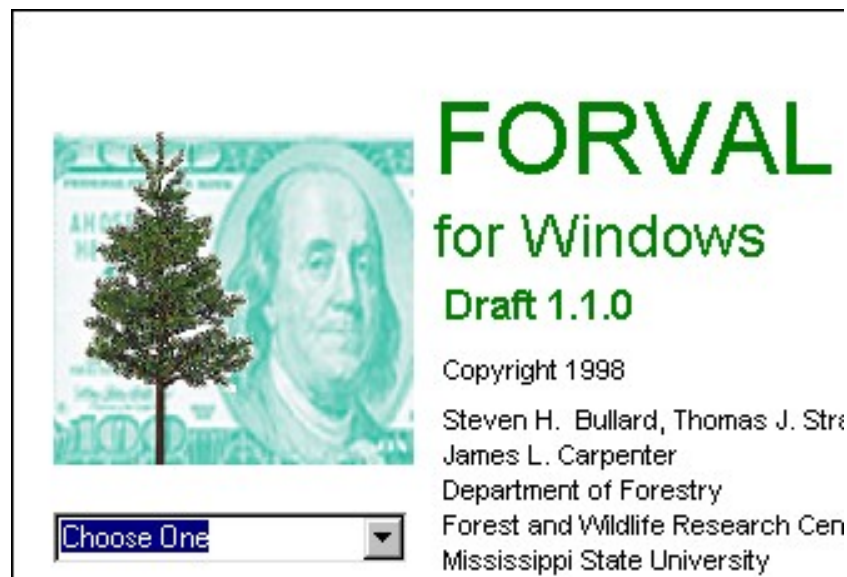
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**Disclaimer:** This software is designed to help estimate the investment value of timber and timberland, and to help evaluate forestry investments from a financial standpoint. Estimates obtained while using this software are believed to be accurate for given sets of user-specified inputs. The authors are not responsible, however, for specific estimates or decisions made by users of the software.

## FORVAL for Windows: A Computer Program for Forest Valuation



FORVAL (FOReSt VALuation) for Windows is a computer program for cash flow analysis of forestry investments. FORVAL was written in Visual Basic and is available from the Forest and Wildlife Research Center at Mississippi State University. FORVAL for Windows requires these hardware and software specifications:

- Windows 95 or later, or Windows NT 3.51 or later
- a 3.5" disk drive
- a mouse or other pointing device
- 486 or higher microprocessor
- VGA or higher resolution monitor
- 8 MB of RAM
- 2.1 MB of hard disk space

FORVAL is designed to be used without a manual. The program is user-friendly and includes a Windows Help file. Users enter the data requested for each box on the form and then press an appropriate button to perform the desired action.

### Installation and Use

To install the program, insert Disk 1 into your computer. Go to the Start menu and select the Run option. To begin the setup program that is included with FORVAL type a:\setup.exe. Follow the on-screen directions to complete setup. After setup is complete, select the FORVAL option from the Programs section of the Start menu.

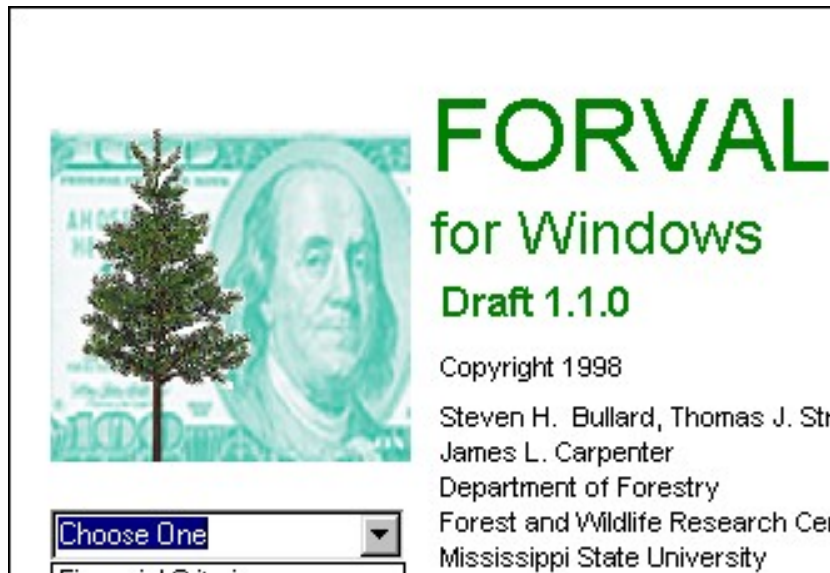


Figure 1.

On the title page (Figure 1), the user must choose one of four forms to begin calculations. The choices are the financial criteria form, annual/monthly payment form, precommercial timber value form, and projected stumpage value form. The financial criteria form is used to make various financial analyses, such as net present value, future value, rate of return, and other measures of financial performance. The payment form is used to calculate the monthly or annual payments needed to repay a loan or accumulate a future sum in a specific time period. The precommercial timber value form calculates a value estimate of an immature stand of timber for the current age “A.” The projected stumpage value is used to calculate the future value in year “A” of a tract of standing timber.

#### Financial Criteria

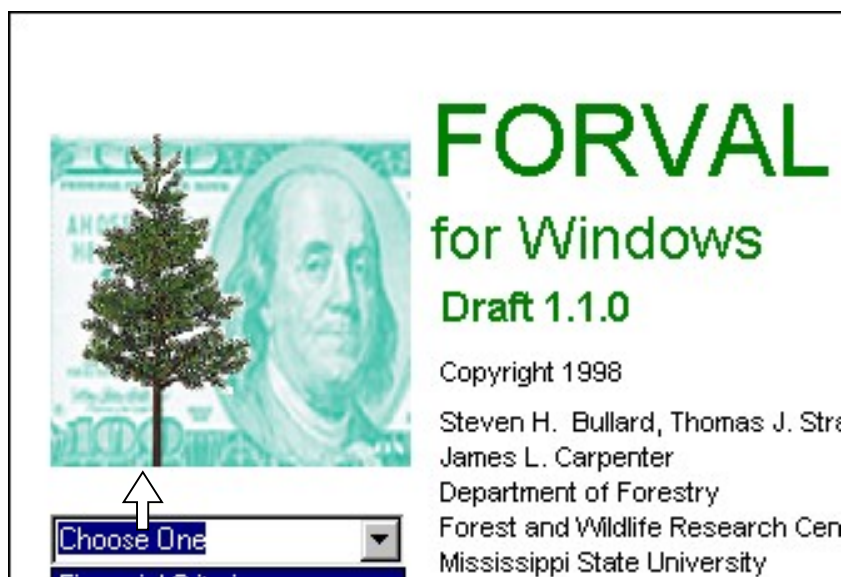


Figure 2.

From the title page choose **Financial Criteria** (Figure 2), once selected you will see the following window (Figure 3).

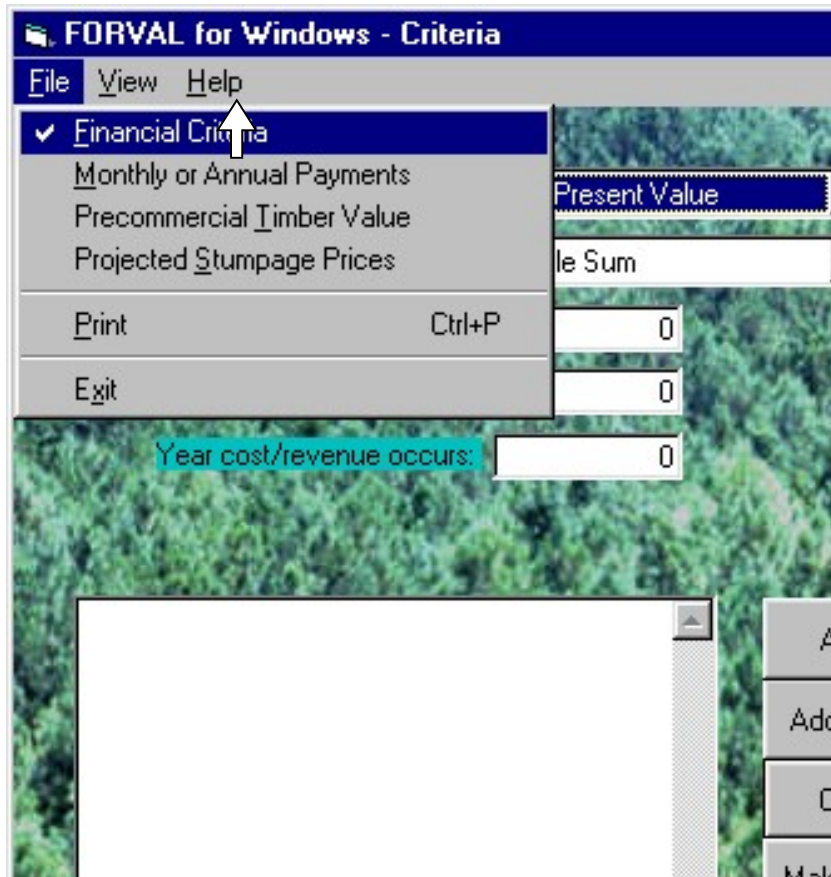


Figure 3.

Users are allowed to switch from one form to another during the program by going to the **File** menu and selecting the desired form (Figure 3). When switching to another form, the current form will be reset and all information will be erased.

The first choice the user makes is the type of standard financial calculation(s) to make. The following financial criteria are presented by the program:

- The **Net Present Value** (NPV) option calculates the present value of all revenues minus the present value of all costs.
- The **Rate of Return** (ROR) determines the interest rate that makes the net present value equal to zero. This is the rate of interest actually earned on the investment. In FORVAL for Windows, an iterative process is used to estimate the rate of return to the nearest 0.01%. This program will not calculate a ROR greater than 200%.
- The **Equivalent Annual Income** (EAI) is the annual sum of money that is equivalent to a projected stream of costs and revenues. EAI is often used to compare or rank investments that are not equal in duration.
- The **Benefit/Cost Ratio** (B/C Ratio) indicates a project's return per dollar of investment. B/C ratio is the present value of all revenues divided by the present value of all costs.
- The **All of the Above** option calculates the Net Present Value, Rate of Return, Equivalent Annual Income, and Benefit/Cost Ratio.

- The **Land Expectation Value** (LEV) is the value of land for perpetual forest production (Straka and Bullard, 1996). It is the net present value of all revenues and costs associated with growing timber on the land. LEV is often called "bare land value" or "soil expectation value."
- The **Future Value** option calculates the value of a single cash flow at a future date.

**Net present value** (NPV) is one of the most common financial criteria. It is also called Net Present Worth, Present Net Value, and Present Net Worth. NPV is the discounted value of an investment's cash flows. Net implies the discounted value of all costs is subtracted from the discounted value of all revenues. Since all cash flows are discounted, an interest rate must be specified.

Before illustrating the use of FORVAL it would be instructive to solve a small financial problem on paper. Consider the example of a landowner asking you to determine the NPV of regenerating 40 acres of land. His alternative rate of return is 4% (net of inflation and taxes). The investment is outlined in Table 1.

Table 1. Cash flow from a typical forestry investment (per acre)

Item	Year Incurred	Type of Cost/Revenue	Amount
Establishment Cost	0	Single Sum	\$-160.00
Annual Management & Tax Cost	1-27	Terminating Annual	- 2.50
Thinning Revenue	16	Single Sum	97.50
Thinning Revenue	22	Single Sum	156.00
Harvest Revenue	27	Single Sum	1,287.00

The NPV of this investment is the cumulative value of all the cash flows, each discounted at 4%. FORVAL does all of this for you. The actual steps are in Table 2.

Table 2. Calculation of Net Present Value (i = 4%).

Item	Year Incurred	Amount	Formula	Discounted Value
Establishment Cost	0	\$160.00	-	-\$160.00
Annual Management & Taxes	1-27	- 2.50	$\frac{(1.04)^{27} - 1}{(1.04) - 1}$	-40.82
Thinning Revenue	16	97.50	$1 / (1.04)^{16}$	52.05
Thinning Revenue	22	156.00	$1 / (1.04)^{22}$	65.83
Harvest Revenue	27	1287.00	$1 / (1.04)^{27}$	<u>446.35</u>
Net Present Value				\$363.41

If the NPV equaled zero, the investment would earn exactly the interest rate used in the calculation. An investment is acceptable if the NPV is equal to or greater than zero. In this case the investment earned a 4% rate of return plus \$363.41. This means you have earned at least the interest rate you used in the calculation.

**Rate of return (ROR)** is the interest rate earned by the investment. ROR is the average rate of capital appreciation during the life of an investment. It is also called the internal rate of return (IRR). To solve for ROR directly, one would have to solve and resolve the NPV problem with various interest rates until the NPV effectively equaled zero. This is time-consuming, but not difficult. Knowledge of compound interest tells us that the interest rate used in Table 2 must be higher than 4% to reduce NPV. An educated guess says 8% ought to be close to the interest rate that reduces NPV to zero. Recalculating Table 2 with an 8% interest rate results in a NPV of \$30.93. Thus, the ROR must be higher than 8%. When 9% is used to recalculate Table 2, NPV becomes -\$11.46. There is no formula to calculate ROR directly; one has to recalculate the problem until NPV becomes zero. In our example this happens at 8.71%. At an 8.71% interest rate NPV is \$-0.23 (close enough to zero for our calculation as we only need ROR to two decimal places).

**Equivalent Annual Income (EAI)** is the annual income equivalent to a specified NPV at a specific interest rate. It is also called Annual Equivalent, Equal Annual Equivalent, Annual Income Equivalent, and Net Annual Equivalent. The criterion is often used to compare or rank investments that are not equal in duration, but is popular in forestry investment analysis for comparing timberland investments to annual income from other land uses such as pasture rent or agricultural crops.

Table 2 represents a typical forestry investment over a 27-year rotation. The question a forester often gets is, "How does that compare to my option of renting the land out as pasture at \$20

per acre per year?". At 4% interest we can calculate an equivalent annual income that will equal the NPV of Table 2. The calculation is:

$$\begin{aligned} \text{EAI} &= \text{NPV} \left[ \frac{0.04 (1.04)^{27}}{(1.04)^{27} - 1} \right] \\ &= 363.41 \left[ \frac{(.04) (1.04)^{27}}{(1.04)^{27} - 1} \right] = 22.25 \end{aligned}$$

At 4% interest, a landowner should be indifferent between \$363.41 today or \$22.25 per year for 27 years. Both are equivalent.

The **Benefit/Cost Ratio** (B/C) of an investment is the total present value of revenues divided by the total present value of all costs. An acceptable investment will have a B/C ratio equal to or greater than 1. In this case the present value of revenues at least equals the present value of costs. B/C ratios are most commonly used by public agencies. In Table 2, if the sum of the three discounted revenues is divided by the sum of the two discounted costs we obtain a B/C ratio of 2.8.

**Land Expectation Value** (LEV) is the value of bare land if put into perpetual forest production. It is also called bare land value or soil expectation value. The calculation involves compounding all costs and revenues, including establishment cost but not including land cost (land value is what the user is calculating), to the end of a single rotation. This net future value is assumed to occur at the end of every rotation length to form a perpetual series. The value of bare land in perpetual forest production is a fundamental forest valuation calculation. The data in Table 2 can be used to illustrate the calculation because land cost was not included in the problem and the 4% interest rate is a real interest rate (net of inflation). Table 3 shows the LEV calculation.

Table 3. Calculation of Land Expectation Value (i = 4%)

Item	Year Incurred	Amount	Formula	Compounded Value
Establishment Cost	0	-\$160.00	$(1.04)^{27}$	-\$461.34
Annual Management & Tax Cost	1-27	- 2.50	$\frac{(1.04)^{27} - 1}{.04}$	- 117.71
Thinning Revenue	16	97.50	$(1.04)^{11}$	150.10
Thinning Revenue	22	156.00	$(1.04)^5$	189.80
Harvest Revenue	27	1287.00	-	<u>1,287.00</u>
			Net Future Value	\$1,047.85
$\text{LEV} = \frac{1,047.85}{(1.04)^{27} - 1} = \$556.37$				

Land expectation value is \$556.37. This represents the maximum amount that could be paid for the land for forestry uses - if the required interest rate of 4% must be earned and if the timber values assumed are those actually expected for the property.

The **Future Value (FV)** criterion calculates the future value of a single sum of money. For example, the future value of any of the single sum amounts in Table 3 can be calculated using this criterion.

### Inputs for Financial Criteria

The user begins by choosing the type of calculation or financial criteria. The choices consist of the criteria discussed above. The type of cost or revenue to be entered is selected. The interest rate, the dollar amount of the cost or revenue, and the year it occurs are entered. For terminating annual entries, the beginning and ending years are entered. To use 6% as the interest rate, 6 or 0.06 may be entered. For all calculations except future value, enter the year the cost/revenue occurs from the beginning of the rotation, not the number of years until the end of the rotation.

There are four choices for the individual costs and revenues. The choices are single sum, terminating annual, perpetual annual, and perpetual periodic. All costs and revenues can be entered as one of these choices.

- A **Single Sum** cost or revenue occurs only once during the life of an investment. For example, if the investment consists of a timber rotation, establishment costs occur only once and, thus, are a single sum. Note that Table 1 identifies the single sums in the prior example.
- A **Terminating Annual** cost or revenue occurs annually for a set length of time during the investment. In the prior example, management and tax costs occurred annually until the end of the rotation.
- A **Perpetual Annual** cost or revenue occurs annually for an infinite period of time (Perpetual annual costs or revenues cannot be used to calculate a future value). Many calculations in forestry involve perpetual series. Land expectation value is a good example. This option might be used for the value of annual property taxes in perpetuity.
- A **Perpetual Periodic** cost or revenue occurs periodically for an infinite period of time. (Perpetual periodic costs and revenues cannot be used to calculate a future value). This calculation is standard for forestry. Many activities in forestry occur on a regular perpetual basis. Perhaps, a timber harvest occurs every five years from a portion of an uneven-aged forest. The value of any regular non-annual uniform series can be calculated via this option.



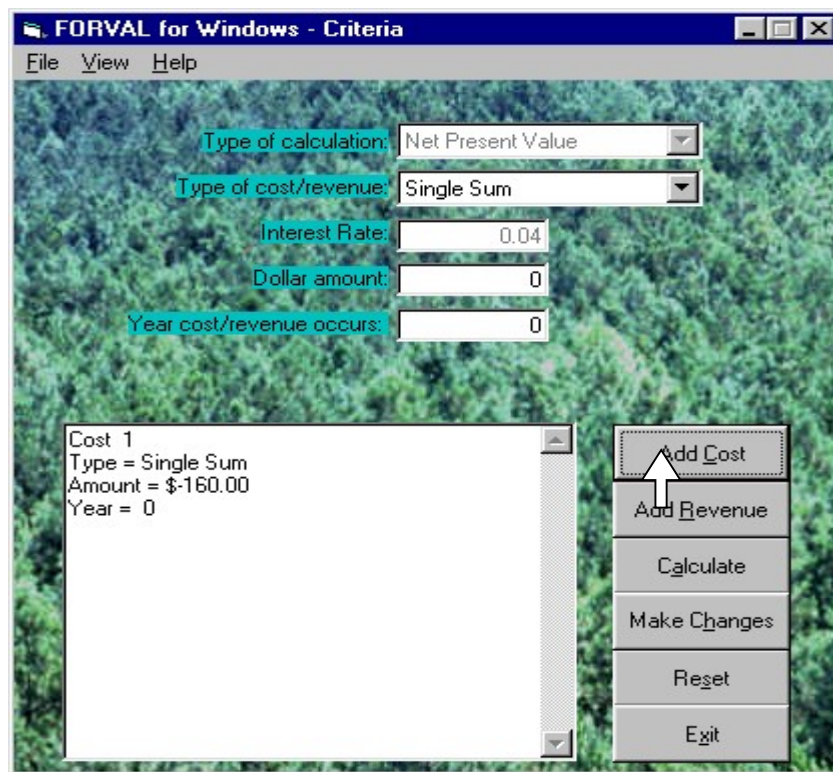


Figure 4.

The first entry is the first row of information in Table 1 (Establishment Cost). After choosing the type of cost and entering the amount of the cost and the year the cost occurs, select **Add Cost**. When this step is complete the user should see a summary of the entry in the text box located at the bottom of the window on the left-hand side (Figure 4). The next step involves selecting the **Terminating Annual** option from the **Type of cost/revenue** (Figure 5).

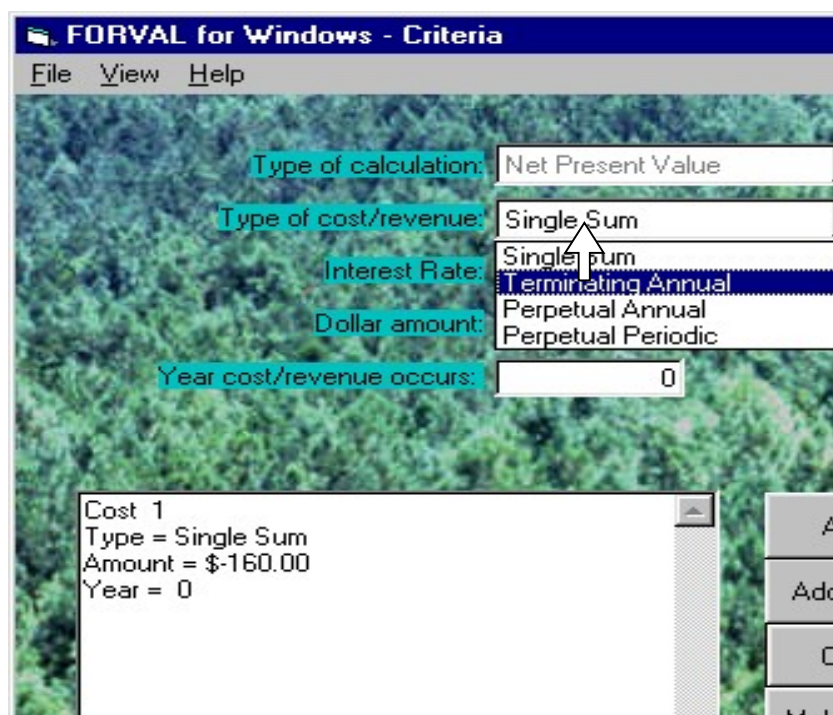


Figure 5.

The second entry is the second row of Table 1 (Annual Management and Tax Cost). Once the entry is made select **Add Cost**. When this step is complete the user should see a summary of the entry in the text box located at the bottom of the window on the left-hand side (Figure 6). The next step involves selecting the **Single Sum** option from the **Type of cost/revenue** (Figure 7).

The screenshot shows the 'FORVAL for Windows - Criteria' window. The 'Type of calculation' is set to 'Net Present Value' and 'Type of cost/revenue' is set to 'Terminating Annual'. The 'Interest Rate' is 0.04, 'Dollar amount' is 0, 'Year cost/revenue begins' is 0, and 'Year cost/revenue ends' is 0. A text box on the left displays the summary for 'Cost 2':  
 Cost 2  
 Type = Terminating Annual  
 Amount = \$-2.50  
 Begins in Year 1  
 Ends in Year 27  
 The 'Add Cost' button is highlighted with a mouse cursor.

Figure 6.

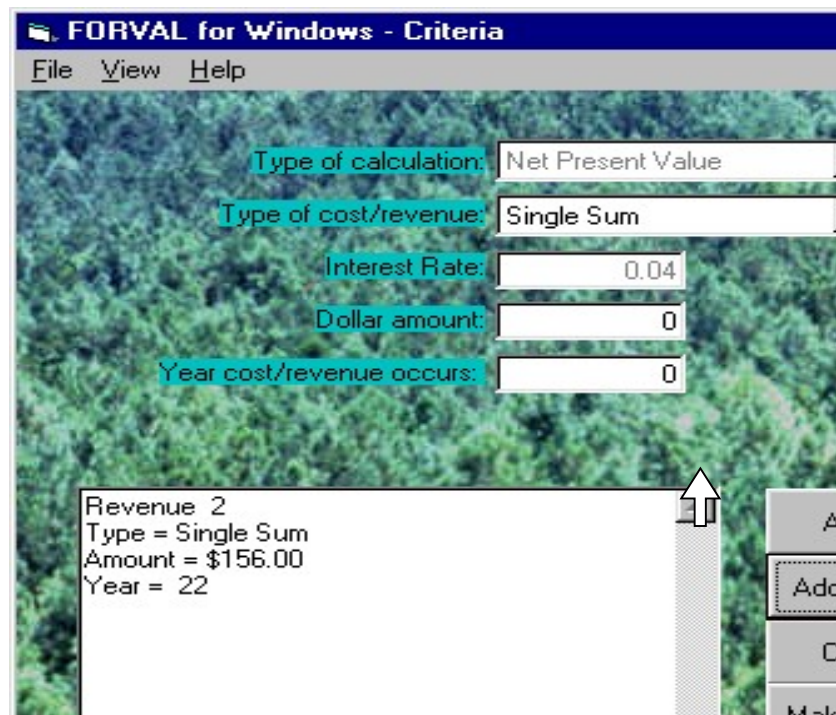
The third entry comes from the third row of Table 1 (Thinning Revenue). Once the entry is made select **Add Revenue**. When this step is complete the user should see a summary of the entry in the text box located at the bottom of the window on the left-hand side (Figure 7).

The screenshot shows the 'FORVAL for Windows - Criteria' window. The 'Type of calculation' is set to 'Net Present Value' and 'Type of cost/revenue' is set to 'Single Sum'. The 'Interest Rate' is 0.04, 'Dollar amount' is 0, and 'Year cost/revenue occurs' is 0. A text box on the left displays the summary for 'Revenue 1':  
 Revenue 1  
 Type = Single Sum  
 Amount = \$97.50  
 Year = 16  
 The 'Add Revenue' button is highlighted with a mouse cursor.

Figure 7.



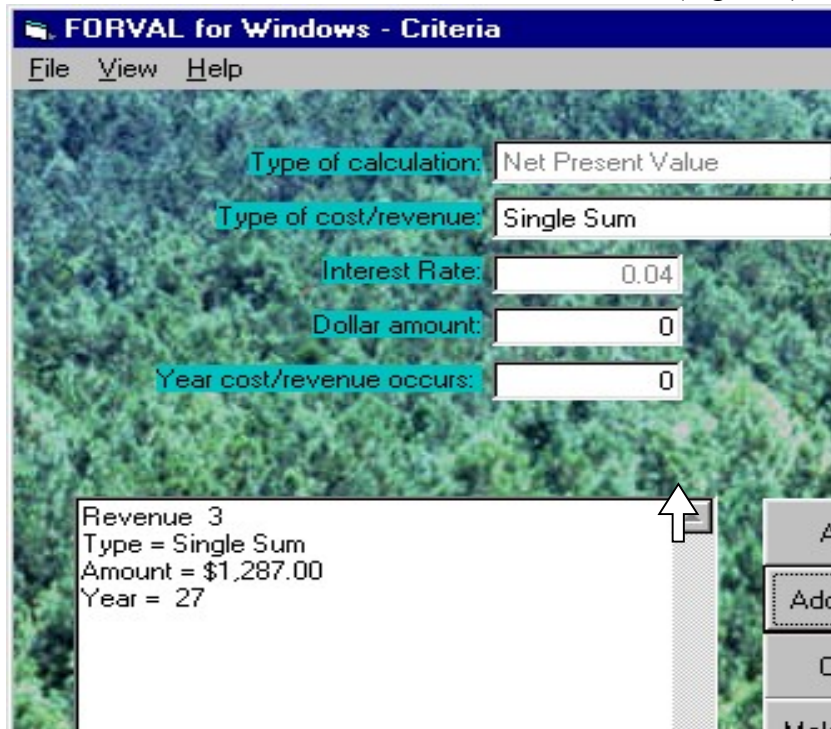
The fourth entry comes from the fourth row of Table 1 (Thinning Revenue). Once the entry is made select **Add Revenue**. When this step is complete the user should see a summary of the entry in the text box located at the bottom of the window on the left-hand side (Figure 8).



The screenshot shows the 'FORVAL for Windows - Criteria' window. The background is a forest image. The window has a menu bar with 'File', 'View', and 'Help'. Below the menu bar, there are five input fields with labels in red text: 'Type of calculation:' (dropdown menu showing 'Net Present Value'), 'Type of cost/revenue:' (dropdown menu showing 'Single Sum'), 'Interest Rate:' (text box showing '0.04'), 'Dollar amount:' (text box showing '0'), and 'Year cost/revenue occurs:' (text box showing '0'). At the bottom left, there is a text box containing the summary: 'Revenue 2', 'Type = Single Sum', 'Amount = \$156.00', and 'Year = 22'. To the right of the text box is a vertical scrollbar. On the far right, there are buttons: 'Add', 'Cost', and 'Make'.

Figure 8.

The fifth entry comes from the fifth row on Table 1 (Harvest Revenue). Once the entry is made select **Add Revenue**. When this step is complete the user should see a summary of the entry in the text box located at the bottom of the window on the left-hand side (Figure 9).



The screenshot shows the 'FORVAL for Windows - Criteria' window. The background is a forest image. The window has a menu bar with 'File', 'View', and 'Help'. Below the menu bar, there are five input fields with labels in red text: 'Type of calculation:' (dropdown menu showing 'Net Present Value'), 'Type of cost/revenue:' (dropdown menu showing 'Single Sum'), 'Interest Rate:' (text box showing '0.04'), 'Dollar amount:' (text box showing '0'), and 'Year cost/revenue occurs:' (text box showing '0'). At the bottom left, there is a text box containing the summary: 'Revenue 3', 'Type = Single Sum', 'Amount = \$1,287.00', and 'Year = 27'. To the right of the text box is a vertical scrollbar. On the far right, there are buttons: 'Add', 'Cost', and 'Make'.

Figure 9.

Now choose **Calculate**. When the **Calculate** button is pressed, the answer and all information that has been entered is displayed in the large text box at the bottom of the form. The information in this text box can be printed by selecting **Print** from the **File** menu (Figure 10).

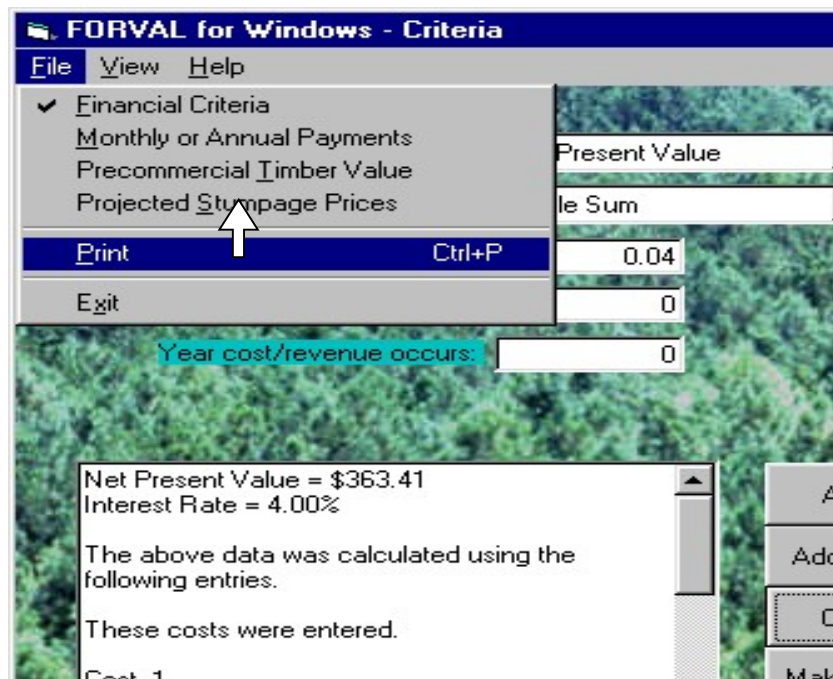


Figure 10.

In FORVAL, LEV is calculated much the same way as with NPV with one exception. Land Expectation Value needs to be selected in the **Type of Calculation** box. The previous entries are also made with the calculation of LEV. However, once you choose **Calculate** the program will prompt the **Rotation length** window which asks “Enter the final year of rotation” (Figure 11). In the present example the final year of rotation is 27. The answer and all information that has been entered is displayed in the large text box at the bottom of the form (Figure 12). The information in this text box can be printed by selecting **Print** from the **File** menu (Figure 10).

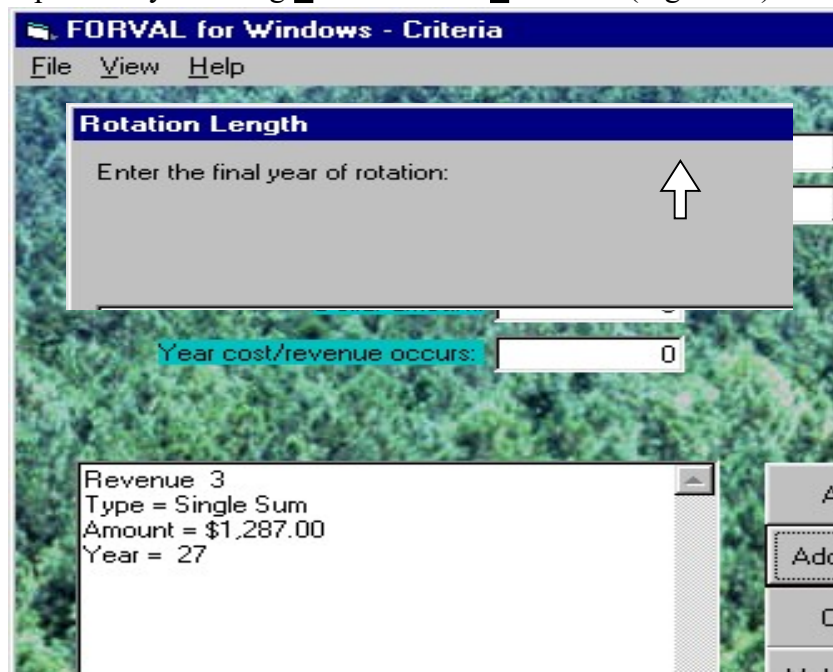


Figure 11.

**FORVAL for Windows - Criteria**

File View Help

Type of calculation: Land Expectation Value

Type of cost/revenue: Single Sum

Interest Rate: 0.04

Dollar amount: 0

Year cost/revenue occurs: 0

Land Expectation Value = \$556.37  
 Rotation Length = 27  
 Interest Rate = 4.00%  
 The above data was calculated using the following entries.  
 These costs were entered

Add  
 Change  
 Make Changes

Figure 12.

After calculating the answer, the type of calculation to perform or the interest rate may be changed. Additional costs or revenues may also be entered. Before beginning a new problem, the user must press the **Reset** button. After pressing the **Reset** button, the user will be asked to confirm this decision.

At any point while FORVAL is running, the user may view all costs or revenues entered or make changes to a cost or revenue. To view all costs or revenues that have been entered, go to the menu bar and select the **View** option. Then select **View Costs** or **View Revenues**. When this choice is made, all costs or revenues that have been entered can be viewed in the large text box at the bottom of the form.

To make changes to a cost or revenue begin by clicking the **Make Changes** button on the form. Another form will appear asking if you would like to change a cost or revenue. Click the desired option and enter the number of the cost or revenue you would like to change. After the **OK** button is clicked, all the information about the cost or revenue will appear on the form in the appropriate boxes. Make the desired changes and click the **Save Changes** button. This will save the changes that were made. If an error occurs, the process must be restarted by clicking the **Make Changes** button.

## Monthly or Annual Payments

The monthly or annual payments form is used to calculate the amount of each payment to either repay a loan or accumulate a future sum. This calculation is performed using the amount to be borrowed or accumulated, the interest rate, and the number of years to repay the loan or accumulate the sum.

The user begins by choosing to accumulate a future sum or to repay a loan. The frequency of payments is then selected as annual or monthly. After making these selections, the dollar amount to be saved or the amount of the loan, the number of years of payments, and the annual interest rate are entered. To use 6% as the interest rate, 6 or 0.06 may be entered. The user then presses the **Calculate** button. The information in this text box can be printed by selecting **Print** from the **File** menu.

The option to **Accumulate a Future Sum** determines the amount of each payment that is necessary to accumulate a future sum in the stated time. This is an account where you make payments to yourself. Interest on the account is compounded. This calculation uses the Sinking Fund formula.

The option to **Repay a Loan** determines the amount of each payment necessary to repay a loan in the stated time. This calculation uses the Capital Recovery formula.

The two basic formulas are:

Sinking Fund Formula

$$a = V_n \left[ \frac{i}{(1+i)^n - 1} \right]$$

Capital Recovery Formula

$$a = V_o \left[ \frac{i(1+i)^n}{(1+i)^n - 1} \right]$$

where

- a = annual payment
- i = interest rate expressed as a decimal
- $V_n$  = amount to be accumulated
- $V_o$  = amount to be paid back
- n = number of compounding periods (years)

### **Example of a Sinking Fund Problem**

How much money would you need to set aside each year to accumulate enough money to replace a \$40,000 truck in seven years? Your "sinking fund" account will earn 5.25% annually.



**FORVAL for Windows - Payments**

File Help

Payments to: Accumulate a Future Sum

Type of payments: Annual

Dollar Amount: 40000

Number of Years: 7

Annual Interest Rate: 5.25

Each payment will be \$4,875.55

Total Amount = \$40,000.00

Annual Interest Rate = 5.25%

For 7 years

Figure 13.

The information needed to complete the screen is:

Payments to:	Accumulate a Future Sum
Type of payments:	Annual
Dollar amount:	40,000
Number of years:	7
Annual interest rate:	5.25

Each payment will be \$4,875.55 (Figure 13).

What if the payments were monthly? Simply change type of payments to Monthly. Monthly payments would be \$395.07 over 84 months.

### Example of a Capital Recovery Problem

You purchase a new truck for \$40,000 and take out a loan for the full amount. You agree to 84 monthly payments at 5.25% interest. What is your monthly payment?

FORVAL for Windows - Payments

File Help

Payments to: Repay a Loan

Type of payments: Monthly

Dollar Amount: 40000

Number of Years: 7

Annual Interest Rate: 5.25

Each payment will be \$570.07

Total Amount = \$40,000.00

Annual Interest Rate = 5.25%

For 84 months

Figure 14.

The information needed to complete the screen is:

Payments to:	Repay a loan
Type of payments:	Monthly
Dollar amount:	40,000
Number of years:	7
Annual interest rate:	5.25

Each payment will be \$570.07 (Figure 14).

The details of both formulas are well-described in Section 3.3 of Bullard and Straka (1998).

### Precommercial Timber Value

The precommercial timber value form calculates the value of a tract of immature timber at the stand's current age. The calculation is done first by finding the projected rate of return which must be less than 200%. The inflation rate of the tract of land is calculated, and finally the annual land rent is calculated. The valuation method is fully presented in Bullard and Straka (1998).

For this calculation, the user enters the beginning and ending land cost, current age, and rotation length of the timber. The costs and revenues are then entered by choosing the type of cost or revenue, the amount, and the year the cost or revenue occurs (for terminating annual entries the ending year must also be entered). After entering this information, press either the **Add Cost** or **Add Revenue** button. When all costs and revenues have been entered, press the **Calculate** button. The estimated value, rate of return, and information on all costs and revenues are displayed in the text box at the bottom of the form. The information in this text box can be printed by selecting **Print** from the **File** menu.



At any point while FORVAL is running, the user may view all costs or revenues entered or make changes to a cost or revenue. To view all costs or revenues that have been entered, go to the menu bar and select the **View** option. Then select **View Costs** or **View Revenues**. When this choice is made, all costs or revenues that have been entered can be viewed in the large text box at the bottom of the form.

To make changes to a cost or revenue begin by clicking the **Make Changes** button on the form. Another form will appear asking if you would like to change a cost or revenue. Click the desired option and enter the number of the cost or revenue you would like to change. After the **OK** button is clicked, all the information about the cost or revenue will appear on the form in the appropriate boxes. Make the desired changes and click the **Save Changes** button. This will save the changes that were made. If an error occurs, the process must be restarted by clicking the **Make Changes** button.

The valuation technique considers all costs and revenues, explicitly including land cost. You must invest in land to grow timber; thus this opportunity cost should be considered when valuing a precommercial timber stand. Once all costs and revenues are entered, the user clicks on **Calculate**. The internal rate of return for a single rotation of the stand is calculated. This interest rate is used to compound all costs to the year of valuation.

Consider a simple example. You need to calculate the value of a 10-year old pine plantation. Originally the land was worth \$400 per acre. To keep the calculation simple, we will assume no land appreciation. At the end of the 25-year rotation, land will be worth \$400 per acre. Regeneration at year 0 costs \$100 per acre and timber revenue at year 25 will be \$2,500 per acre.

Data needed to complete the calculations are:

Beginning Land Value	400
Ending Land Value	400
Current Age	10
Rotation Length (in years)	25
Type of Cost	Single Sum
Amount of Cost	100
Year Cost Occurs	0
Type of Revenue	Single Sum
Amount of Revenue	2500
Year Revenue Occurs	25

The program calculates a 7.29% rate of return and an estimated value of timber of \$610.56. Because we used a simple example, the calculation can be easily illustrated. First, both costs occurred at year 0 (land cost of \$400 and regeneration cost of \$100). This equates to a single cost of \$500 per acre at year 0. Second, both revenues occur at year 25 (land sale of \$400 and timber sale of \$2,500). This equates to a single revenue of \$2,900 per acre at year 25. We can solve for the rate of return by calculating the  $(2900/500)^{1/25} - 1$ . This rate of return is 7.29%. That is, a single rotation using these costs and revenues earns a 7.29% rate of return.

**FORVAL for Windows - Precommercial Value**

File View Help

Beginning Land Value: 400

Ending Land Value: 400

Current Age: 10

Rotation Length (in years): 25

Type of Cost/Revenue: Single Sum

Amount of the cost/revenue: 0

Year cost/revenue occurs: 0

Estimated value of timber = \$610.56

The rate of return = 7.29%

Beginning land value = \$ 400

Ending land value = \$ 400

The current age = 10 years

The rotation length = 25 years

These costs were entered

Add

Cost

Make

Figure 15.

Since \$400 of capital is tied up in growing the trees (the land), an annual opportunity cost must be calculated. Using the rate of return as the interest rate, this opportunity cost is  $0.0729 \times \$400 = \$29.16$  per acre per year.

First we need to obtain the value of \$100 spent 10 years ago using a 7.29% interest rate. This is \$202.11 (obtained by calculating the future value of a single sum:  $100 (1.0729)^{10}$ ). Second, we need to calculate the value of \$29.16 per year for 10 years (future value of a terminating annual series). This is \$408.45. Adding the two compounded costs yields \$610.56.

The value of the compounded costs, \$610.56, is the value of the precommercial timber (Figure 15). Using the same interest rate all future costs and revenues could be discounted to year 10. This would again produce a value of \$610.56. Thus, this method produces a consistent value, using the standard concepts of both seller's and buyer's value (see Bullard and Straka 1998).

### Projected Stumpage Value

The projected stumpage price form calculates the future value of a stumpage price. The calculation is performed using the present price, the number of years projected, and the compound annual rate of increase. The underlying formula is the future value of a single sum.

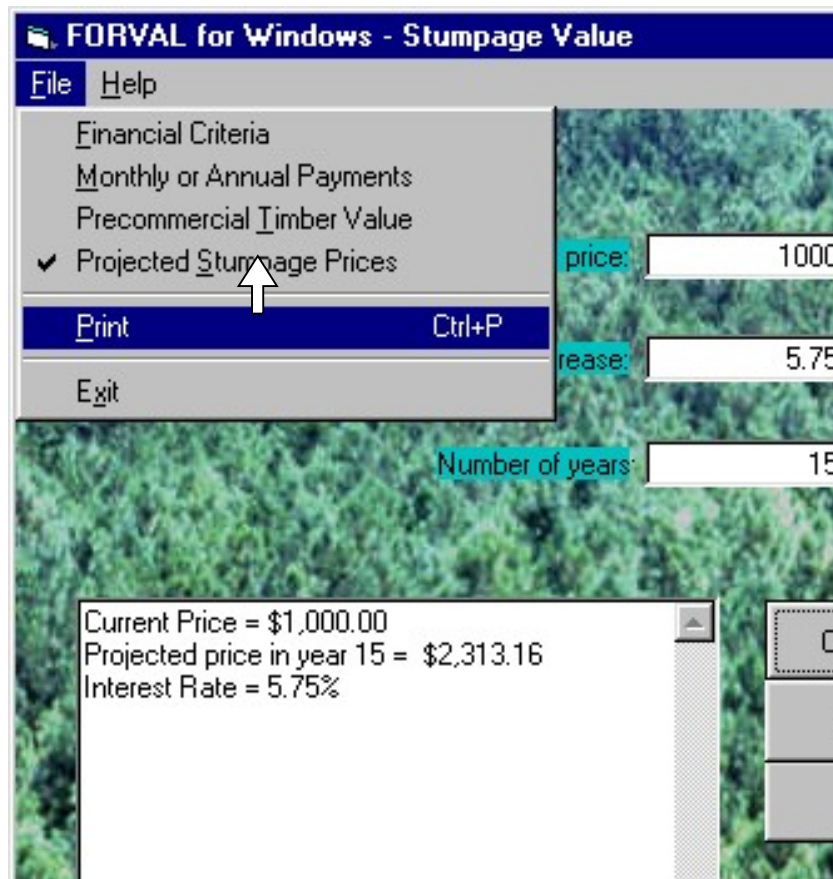


Figure 16.

The user begins by entering the present price, the annual rate of increase, and the number of years projected. To use a 6% annual rate of increase, 6 or 0.06 may be entered in the text box. After these values have been entered, the **Calculate** button is pressed and all information that was entered and the final answer are displayed in the text box at the bottom of the form. The information in this text box can be printed by selecting **Print** from the **File** menu (Figure 16).

#### References

- Bullard, Steven H. and Thomas J. Straka. 1998. Basic Concepts in Forest Valuation and Investment Analysis. Copyright Bullard-Straka, GTR Printing, Starkville, MS. 276 p.
- Straka, Thomas J. and Steven H. Bullard. 1996. "Land Expectation Value Calculation in Timberland Valuation." The Appraisal Journal 64(4):399-405.