Notes for **Tuesday, February 17, 2004**

**Announcements**

Test will be held during lab hours tomorrow afternoon.
- Can go longer than regular lab period, if needed.
- Bring a study sheet: 2 sides, write anything you want. Calculators are essential.

Reading assignment for Thursday: Read Chapter 8.
- No Study Questions

**Continue with Forest Value...**

**Example**
- Review cutting immediately
- What if we wait to harvest?

**The Forest Value Formula**

**Separating the Value of the Land and the Value of the Timber**
**Forest Value – Waiting to Harvest**

**Example: Waiting to Harvest**

In the previous example, perhaps the stand should not be harvested immediately.

- Consider waiting 10 years to harvest the stand.
- You estimate that the stand volume would increase to
  - 24 mbf of sawtimber and
  - 12 cords of pulpwood per acre.

**L** Should you let the stand grow for another 10 years?

**L** What is the forest value in this case?
Forest Value – Waiting to Harvest

The present value of the first harvest

L In ten years, you will be able to sell the timber for:

\[
Timber\ value = \sum_{p=1}^{2} P_p Y_{p,10}
\]

\[
= \$325/mbf \times 24mbf + \$7/cd \times 12cd
\]

\[
= \$7,884
\]

L Of course, you have to wait ten years before you can realize this timber value.

L So this value needs to be discounted:

\[
PV_{Timber} = \frac{\$7,884}{(1.05)^{10}} = \$4,840.09
\]
Forest Value – Waiting to Harvest

Costs that occur before the next harvest

L Taxes will have to be paid on the property over the next ten years.

L To account for this, subtract the present value of ten annual tax payments:

\[
P_{\text{taxes}} = \frac{5[(1.05)^{10} - 1]}{0.05(1.05)^{10}} = 38.61
\]

L Thus, the net present value for the remainder of the current rotation is $4,801.48. ($4,840.09 - $38.61)
Forest Value – Waiting to Harvest

Accounting for future rotations

L After clearcutting in ten years, you will have bare land.

L The LEV calculated earlier indicates that the value of this bare land will be $169.42.
- This gives the discounted value of all of the future rotations on the site.

L But it is a future value that occurs in ten years.
- The future rotations won’t start for another ten years.

L The bare land value (LEV) must also be discounted for ten years before it is added to the present value of the current rotation:

\[ PV_{LEV} = \frac{169.42}{(1.05)^{10}} = 104.01 \]
Forest Value – Waiting to Harvest

L The Forest Value when the harvest is delayed is:
the present value of the current rotation
plus...
the present value of all future rotations.

L Thus, the Forest Value when the harvest is delayed for 10 years is $4,905.49.

\[ \text{\$4,801.48 + \$104.01} \]

L Compare this with the Forest Value if the tract is harvested now — $6,117.42.

L You would lose $1,211.93 per acre if you delay harvesting the stand for ten years.
The Forest Value Formula

First, some new notation:

\[ T_0 = \text{the time when the current stand is to be harvested}, \]
\[ Y_{p, T_0}^C = \text{the expected yield of product } p \text{ from the current stand at time } T_0, \text{ and} \]
\[ C_h^C = \text{the cost of selling the current stand of timber}. \]

The formula for the Forest Value for a stand that will be harvested in \( T_0 \) years is:

\[
Forest\ Value = \frac{\sum_{p=1}^{n} P_p Y_{p, T_0}^C - C_h^C}{(1 + r)^{T_0}} + \frac{A[(1 + r)^{T_0} - 1]}{r(1 + r)^{T_0}} + \frac{LEV}{(1 + r)^{T_0}}
\]

If a stand is going to be harvested right now (i.e., if \( T_0 = 0 \)), then the above formula simplifies to:

\[
Forest\ Value = \sum_{p=1}^{n} P_p Y_{p, 0}^C - C_h + LEV
\]

In this case, the Forest Value is just the liquidation value of the timber plus the LEV.
**Separating the Value of the Land and the Timber**

Unless the assumptions of the LEV do not apply,

L The value of the land is always equal to the LEV.

Since the Forest Value gives the value of the land and the timber,

L Timber Value / Forest Value - LEV

That is,

\[
Timber\ value = \sum_{p=1}^{n} P_p Y_{p,T_0}^{C} - C_h^{C} - \frac{A[(1 + r)^{T_0} - 1]}{r(1 + r)^{T_0}} + \frac{LEV}{(1 + r)^{T_0}} - LEV
\]

This expression can be re-arranged as:

\[
Timber\ value = \sum_{p=1}^{n} P_p Y_{p,T_0}^{C} - C_h^{C} - \frac{(r \cdot LEV - A)[(1 + r)^{T_0} - 1]}{r(1 + r)^{T_0}}
\]

The two parts of this expression are:

1) the discounted value of the timber harvest, and

2) the present value of an annual cost equal to - the rent on the land minus - a net revenue equal to the annual net revenue.