# Lecture 19. Soil or Land Expectation Value

FOR 2022. Financial Analysis for Natural Resources.

UAM
Making College Possible
School of Forest Resources


## What is maximum value we can attach to "bare land?"

- Start with highest and best use
  - Agriculture
  - Forestry
  - Other developed use (business residential)
- Develop annual or periodic income flow for highest and best use
  - Assumption: that net returns can be repeated indefinitely (in perpetuity)
- Use appropriate formula to find present value of infinite series of payments

"a" received every discount period

$$SEV = \frac{a}{i}$$

"a" received every r discount periods

$$SEV = a\frac{1}{(1+i)^r - 1}$$

Where:
i = interest rate
a = net returns (future dollars)
r = rotation length or period between payments

# Relationship between NPV and SEV

If you have the NPV of a project, you can use this formula to convert it to SEV

$$SEV = NPV + NPV\frac{1}{(1+i)^r - 1}$$

r = the length of the project
i = interest rate

# Examples of SEV…

| Year(s) | Project A | Project B | Project C | Project D |
|---|---|---|---|---|
| 0 | ($150) | | | ($150) |
| 1-30 | ($2) | $6 | | |
| 20 | $50 | | | $480 |
| 30 | $1200 | | $800 | |
| Assume all four projects can be repeated indefinitely<br>Assume project B earns $6 every year | | | | |

1. At an interest rate of 4%, let's calculate SEV for project's B and C.

$$SEV_B = \frac{\$6}{0.04} = \$150$$

$$SEV_C = \$800\frac{1}{1.04^{30} - 1} = \$357$$

2. What is the NPV of B and C? (assume project B is one year in length)

$$NPV_B = \$6(1.04)^{-1} = \$5.77 \qquad NPV_C = \$800(1.04)^{-30} = \$246.65$$

3. Using the NPV of B and C, determine SEV:

$$SEV_B = 5.77 + \frac{\$5.77}{1.04^1 - 1} = \$150 \qquad SEV_C = 246.65 + \frac{\$246.65}{1.04^{30} - 1} = \$357$$

# Examples of SEV…

| Year(s) | Project A | Project B | Project C | Project D |
|---|---|---|---|---|
| 0 | ($150) | | | ($150) |
| 1-30 | ($2) | $6 | | |
| 20 | $50 | | | $480 |
| 30 | $1200 | | $800 | |
| Assume all four projects can be repeated indefinitely<br>Assume project B earns $6 every year | | | | |

1. At an interest rate of 4%, let's calculate NPV for project's A and D.

$$NPV_A = (\$150)(1.04)^{-0} + (\$2)\left[\frac{1-1.04^{-30}}{0.04}\right] + \$50(1.04)^{-20} + \$1200(1.04)^{-30} = \$208.22$$

$$NPV_D = (\$150)(1.04)^{-0} + \$480(1.04)^{-20} = \$69.07$$

2. Using the NPV of A and D, determine SEV:

$$SEV_A = 208.22 + \frac{\$208.22}{1.04^{30}-1} = \$301$$

$$SEV_D = 69.07 + \frac{\$69.07}{1.04^{20}-1} = \$127$$

3. Calculate the net FUTURE value of projects A and D:

$NFV_A = \$675.34$ $NFV_D = \$151.34$

4. Using the NFV of A and D, determine SEV:

$$SEV_A = 675.34\frac{1}{1.04^{30}-1} = \$301$$

$$SEV_D = 151.34\frac{1}{1.04^{20}-1} = \$127$$

# Summary of SEV formulas…

$$SEV = \frac{a}{i}$$

- Receive net cash flow of $a every discounting period

$$SEV = a\frac{1}{(1+i)^r - 1}$$

- Receive net cash flow of $a every r discount periods
  - "a" is future value

$$SEV = NPV + NPV\frac{1}{(1+i)^r - 1}$$

- Net present value of a project that is r discount periods long

# Test your knowledge

What is the present value of receiving $100 per month in perpetuity if your time preference for resources is 6% per year, but you compound monthly?

$$i = \frac{6\%}{12} = 0.005 \qquad V_0 = SEV = \frac{\$100}{0.005} = \$20{,}000$$

What is the present value of receiving $1200 per year in perpetuity if your time preference for resources is 6% per year, but you compound monthly?

$$i = \frac{6\%}{12} = 0.005 \quad V_0 = SEV = \$1200\frac{1}{1.005^{12} - 1} = \$19{,}456$$

# Next lecture…

Review for exam 2…