

Lecture 1: Introduction, economic thought, unique aspects of forest economics

FOR 4684
Natural Resource Economics and
Management



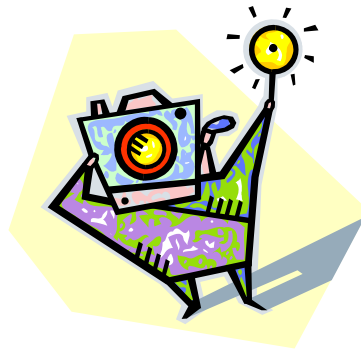
School of Forest Resources



Syllabus

- Meeting times
- Prerequisites
- Office hours
- Assignments and grading
- Course policies
- Tentative course schedule
- Course agreement form

Class pictures!



Economic thought

- Economics is a study of the allocation of scarce resources to maximize human satisfaction
- Focus is on changes in allocations, and *marginal* benefits and *marginal* costs
- Many non-quantifiable factors, but we will strive to use abstract models that are accurate and allow for mathematical rigor

Exercise in mathematical thinking

- The table reflects “units of happiness” for each hour spent doing each activity for a student.
- The student only has 10 hours of free time to spend on these activities this weekend.
- **What combination maximizes this student’s “total happiness” for a weekend?**

Hours spent on activity	“Total happiness” from hours spent in activity			
	Study	Hunt & Fish	Work	Time with friend of opposite sex
1	7	8	6	9
2	13	13	11	15
3	18	17	15	20
4	22	19	18	24
5	24	20	20	25

Exercise in mathematical thinking

- Questions
 - What is “total happiness” for the student?
 - What is marginal happiness for one additional hour allocated to any of the activities?
 - Why will any change in the allocation of resources result in less total happiness?

Hours spent on activity	“Total happiness” from hours spent in activity			
	Study	Hunt & Fish	Work	Time with friend of opposite sex
1	7	8	6	9
2	13	13	11	15
3	18	17	15	20
4	22	19	18	24
5	24	20	20	25

The **“equi-marginal” principle** states that the optimal allocation of inputs is assured when the marginal value of any additional allocation is the same.

Marginal analysis – the with and without principle

" the true net benefit from any added investment in a multiple-use system is the net present value of the system with the investment minus the net present value without the investment"

– Klemperer, Forest Resource Economics and Finance, Ch. 15

Marginal analysis

What are the "marginal" inputs and outputs of project B over project A?

Project A				Project B			
Year	Activity	Output	Cash Flow	Year	Activity	Output	Cash Flow
0	Site prep		(\$125)	0	Site prep		(\$125)
1	Planting		(\$65)	1	Planting		(\$190)
12	1st thinning	25 tons	\$100	12	1st thinning	30 tons	\$120
18	Second thinning	40 tons	\$500	18	Second thinning	50 tons	\$625
24	Third thinning	50 tons	\$1,500	24	Third thinning	70 tons	\$2,100
30	Regeneration felling	120 tons	\$4,500	30	egeneration fellin	150 tons	\$5,625

Marginal inputs and outputs

Year	Marginal output	Marginal cash flow	PV @ 8%
0	No change in site prep		
1	Added cost of improved seedlings		
12	5 tons		
18	10 tons		
24	20 tons		
30	30 tons		
NPV (improved seedlings) =			

With and without analysis

Project A				PV @
Year	Activity	Output	Cash Flow	8%
0	Site prep		(\$125)	(\$125)
1	Planting		(\$65)	(\$60)
12	1st thinning	25 tons	\$100	\$40
18	Second thinning	40 tons	\$500	\$125
24	Third thinning	50 tons	\$1,500	\$237
30	Regeneration felling	120 tons	\$4,500	\$447
				\$663

Project B				PV @
Year	Activity	Output	Cash Flow	8%
0	Site prep		(\$125)	(\$125)
1	Planting		(\$190)	(\$176)
12	1st thinning	30 tons	\$120	\$48
18	Second thinning	50 tons	\$625	\$156
24	Third thinning	70 tons	\$2,100	\$331
30	Regeneration felling	150 tons	\$5,625	\$559
				\$793

With and without says the value of the added planting cost is \$130 per acre at 8% (cost of capital).



Economic efficiency - criteria

- Total benefits must exceed total costs
- Benefits from any separable component must exceed total costs
- Lowest cost practicable technology must be employed to achieve project results



Unique aspects of *forest* economics



1. Length of production period

- 3 days to make an automobile
- To grow a mature “forest” takes longer:
 - 10 years for cottonwood
 - 35 years for pine
 - 80 years for oak
- This causes a problem in predicting future demand, production costs, and prices



2. Non-market benefits and costs

- Known as “externalities”
- Positive externality: A benefit accrues to someone who does not compensate the producer for this good or service.
 - Examples?
- Negative externality: Someone experiences a loss and is not compensated for this loss by the producer.
 - Examples?



3. Standing timber's dual nature

- Both product and factory
- Must “destroy” or “severely modify” the factory to obtain the product.
- A complex replacement problem.
 - Density, species composition, and rotation length must be simultaneously optimized.



4. Derived demand and supply

- What forest products to people use and buy?
- Standing timber's demand is derived from the final products bought and sold by consumers
- But the supply of those products is derived from the trees that are grown and their owners' willingness to sell them.
- Complicated by the intermediate manufacturing processes and buying and selling of intermediate goods.



5. Joint production

- Forests produce many goods simultaneously
 - Sawtimber and pulpwood
 - Clean water and water
 - Wildlife
 - Aesthetics
- Some joint production factors are complimentary, some are competitive.



6. Ownership of production resources

- Most forest resources owned by non-industrial private landowners
 - Issues of private property rights vs. public rights to resource amenities
- Industry and government own much less, though the distribution among owners changes in different parts of the United States.



7. Shifting demands for forest goods

- Traditional demand for market-based, commodity production
 - Examples?
- New directions: non-market, public, and non-exclusive goods
 - Examples?



What economics *cannot* do...

- Economics can tell us about an *efficient* distribution of resources
 - Trade-offs between allocations
- It CANNOT...
 - Tell us what is right or moral,
 - Engineer or change individual or group desires regarding an issue.



Next lecture...

Demand