LECTURE OUTLINE FOR NATURAL RESOURCE ECONOMICS

UNIVERSITY OF COLORADO, FALL 2001

NATURAL RESOURCE ECONOMICS, Econ 3535-001

(for Non-Economics Major Students)

Class Hours: TR 2:00 p.m. to 3:15 p.m. @ Hump 1B80

Instructor: Vijaya R. Sharma, Ph.D.

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Course Introduction

This course presents theories of efficient utilization of natural resources and discusses issues related to current practices of use of resources. It also discusses issues of sustainability, conservation, and preservation. The course extensively uses graphical analyses and requires students a number of readings. An introductory course (Econ 1000) or a course on principles of microeconomics (Econ 2010) is a prerequisite.

Textbook and Readings

2. Prescribed Readings (see the course outline below)
3. Web notes in the web site: http://spot.colorado.edu/~sharmav/

Examinations and Grading

The course grade would be based on performance in three exams (90%) and on fulfillment of assigned readings (10%). Students submit a brief summary (maximum 2 pages) of each assigned reading on its due date. Exam dates are:

   Exam 1 on October 2, Tuesday
   Exam 2 on November 6, Tuesday
   Exam 3 on December 15, Saturday, 1:30 p.m.- 4:00 p.m.

Exams will be scored in two alternative ways. Each exam will be weighed 30%, also alternatively, the worse of the first two exams will be dropped and the remaining two exams weighed 45% each. Whichever method results in a higher score is the method adopted for grading. If a student misses one of the first two exams, that exam is considered dropped. You cannot drop the third exam or both of the first two exams. No makeup examination shall be given. The summary of each prescribed reading has to be turned in on or before its due date for full credit. However, you can receive one-half credit with a late submission on or before the next exam that follows the due date. No further late submission will be accepted.

Course Outline and Tentative Schedule

Section I: Introduction and Basic Economic Concepts

1. Course Introduction (Aug 28, Chapter 1 and Web Notes 1)

   Syllabus and Grading Policy, Types of Resources (Resource Flows, Natural Resources, Environmental Resources), Reasons of Studying Natural Resource Economics (Dynamic decisions, pervasive market failure, potential irreversible consequences, multidisciplinary knowledge), Broad Issues (Efficiency, Sustainability, Resource Scarcity and Economic Growth)

2. Economics Approach and Rule of Economizing Behavior (Aug 30, Chapter 2 and Web Notes 1)

http://spot.colorado.edu/~sharmav/resource/syllabus35.html 8/15/01
Economics Approach and Anthropocentricity, Rule of Economizing Behavior and Examples, Importance of Marginal Analysis

3. Demand, Supply, and Competitive Market (Sep 4,6, Chapter 2 and Web Notes 1)

Demand curve, Marginal Willingness to pay, Declining MB, Consumer Surplus, Supply, Increasing Marginal Cost of Production, Producer Surplus, Market Outcomes, Efficiency, Government Interventions Affecting Efficient Outcomes

4. Market Failure Cases and Role of Government (Sep 6, 11, Chapter 4 and Web Notes 1)


5. Possibility of Government Failure (Sep 11 Chapter 4 and Web Notes 1)

Characteristics of Public Policy Decision Process (Rational voter ignorance, short sightedness, special interest effects, and rent seeking)

6. The Population Problem (Sep 13, Chapter 6)

World and U.S. population growth, Impacts on economic development and environment

7. Types of Resources and Economic Rent of Resources (Sep 18, Chapter 7 and Web Notes 1)

Non-Renewable Resources and Renewable Resources, Economic rent of natural resources, its relation to scarcity

Section II: Economics of Non-Renewable Resources

1. Types of Reserves and Indicators of Physical Scarcity (Sep 20,25, Chapter 7 and Web Notes 1)

Current Reserves, Potential Reserves, Resource Endowment, Price and Size of Reserves, Indicators of Physical Scarcity (static reserve index and exponential reserve index)

2. Dynamic Decision Rule (Sep 25, 27, Chapter 7, Web Notes 2, and pages 48-49 of the textbook)

Concept of Discounting, Present value formula, Choice of discount rate, Two-Period Dynamic Decision Rule and Comparison with Static Economizing Behavior Rule, Marginal User Cost and Rent, Multi-Period Decision Rule, Efficiency vs. Sustainability

Exam 1 on October 2, Tuesday

3. Efficient Extraction of Exhaustible Resources (Oct 9, 11,16; Chapter 7 and also Natural Gas Price Controls in Chapter 8, and Web Notes 2)

Hotelling Rule: Mathematical and Graphical Explanations, Asset Market, Flow Market, Equilibrium Conditions, Best Reserve First, Path of efficient prices and scarcity rent under Zero MEC, Constant MEC, Increasing MEC, Impacts of changes in discount rate, Price of substitute, Stock, MEC, and Demand, Extraction under Monopoly, Negative externality, Effects of Price Ceiling (Historical Regulation of Natural Gas Prices), Myopic Behavior of Flow Market and Role of Asset Market, Role of Government

4. Reading #1 due on October 18: The New Economics of Oil, by Peter Coy, Gary McWilliams, and John Rossant, from the Business Week, November 3, 1997, pp. 140-146 (Oct 18,23)


http://spot.colorado.edu/~sharmav/resource/syllabus35.html
Implications of recycling to stock, exhaustion, and price of virgin resource, Economics of recycling (demand, quality, and cost)

Section III: Economics of Renewable Resources

1. General Characteristics and Problems (Oct 25, 30)
   Renewable but depletable, Regeneration a function of stock or time, Open access, Nonmarket and Public Goods Services, Ecological Complexities

2. Efficient Allocation of Water (Oct 30, Nov 1, Chapter 9 and Web Notes 3)
   Safe Yield Use Principle of Ground Water, Use of ground water as an exhaustible resource, Equimarginal Principle of Allocation of Surface Water, Problems of water rights transfer, and price subsidy and conservation of water
   
   Reading # 3 due on Nov 1: Is Water Different?, by R. Miller, D. Benjamin, and D. North, from The Economics of Public Issues, by the same authors, 10th edition, 1996, pp. 37-41

   Exam 2 on post-Exam 1 materials on Nov 6, Tuesday (deadline for late submission of readings #1,2,3)

3. Optimal Timber Harvesting Rules (Nov 8,13 Chapter 11 and Web Notes 3)
   MAI rule of harvesting, Single Harvesting, Optimum Rotation

4. Sustainable Fishery Harvesting Rules (Nov 13,15,20, Chapter 12 and Web Notes 3)
   Static Model, Dynamic Model

5. Factors Contributing to Inefficient Utilization of forestry (Nov 20,27, relevant sections of Chapters 9, 11, and 12 and Web Notes 3)
   Problems with multiple use of forests, Divergence in discount rate, Economies of scale, pollution and impact on forestry, perverse incentives, Open access problems with forestry and fishery, possibility of species extinction
   
   Readings # 4,5,6 due on Nov 20:
   - Free Market Forestry, by Mark Muro, from the Denver Rocky Mountain News, Sunday, June 1, 1997, pp. 1B
   - Conservation through Commerce, by Ike Sugg, from the Denver Rocky Mountain News, Sunday, July 20, 1997, pp. 1B
   - Bye, Bye, Bison, by R. Miller, D. Benjamin, and D. North, from the Economics of Public Issues, by the same authors, 10th edition, 1996, pp. 164-170

Section IV: Trends of Resource Scarcity, Sustainability, Conservation, and Preservation

1. Resource Scarcity and Economic Growth (Nov 27, Dec 4, Chapter 1, Example 18.5 in page 379 of the textbook, and Web Notes 4)
   Pessimist vs. Optimist Models
   

   Factors Mitigating Scarcity

2. Nonuse Values of Resources and Protection of Biodiversity (Dec 4)
   Definition and Components of Total Economic Value
   Biodiversity and Endangered Species

   Reading #7 due on Dec 4: Economic Assessment of Biodiversity and Protected Species, from Environmental Economics,

3. Sustainability, Conservation, and Preservation (Dec 6, 11, 13, initial sections of Chapter 18 and Web Notes 4)

John Rawl's sustainability principle as nondeclining welfare

Solow-Hartwick sustainability rule of nondeclining capital


Issue of Substitutability of Natural Capital with Manmade Capital, Assymetry of Technological Progress, Changing Preferences in Favor of Natural Resources, Irreversibility, Sustainability as nondeclining flow of physical services of natural resources, Safe Minimum Standard of Use, Preservation, and Conservation


Weak Measure of Sustainable Development, Strong Measure of Sustainable Development, Empirical Findings on Sustainable Development in Selected Countries


Exam 3 on post-Exam 2 materials on December 15, Saturday, 130 p.m. - 400 p.m. (deadline for late submission of readings #4-10)

Accommodations for Students with Documented Disability

The Economics Department will make reasonable accommodations for persons with documented disabilities. Students must notify the instructor within a week of the beginning of the class and provide documentation of the disability obtained from the Disabilities Services Office located in Willard Hall, Room 322.