ENVIRONMENTAL ECONOMICS

AEC 829
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Instructor

- Sandra S. Batie
- Elton R. Smith Professor of Food and Agricultural Policy
- Agricultural Economics
- Batie@msu.edu

Introduction

- Name
- Major and Degree
- School/Department
- Why are you interested in the course?
- Are you interested in any specific environmental issues?
- Career interests
- Other interests and hobbies

Please email a paragraph about you which I can post on the class web-site
Course Plan

- The Basics
  - Economy & Environment, sustainability
  - Welfare economics and Market Failure
- Policy Instruments
  - Standards, taxes, subsidies, permits
- Valuation (project appraisal)
  - Value of risks to life, recreation demand
- Others
  - Environmental IO, Trade and international environmental issues, Corporate Env. Management.
  - International Environmental Problems

Administrative Details

  - AT STUDENT BOOKSTORE
- Additional Reading Materials
  - (Available to Xerox from secretary, Pat Neumann, 219 Ag. Hall)
- Evaluation
  - Team Project (15%) Two assignments (30%), a midterm exam (25%), final exam (25%), and class participation (5%).
- Office Hours: By appointment

Lecture Outline—Introduction

- A. What is Environmental Economics
- B. Definitions
- C. Determinants of Use
- D. What are the Services of the Environment
- E. Linkages between Environment and Economy
  - Material Balance Principle
- F. Limits to Growth
What is Environmental Economics?

- Economics is concerned with allocation of scarce resources—including environmental
- Economics is the study of choice
- Environmental economics is the study of choice as applied to environmental decisions

What is Environmental Economics?

- EE is concerned with the impact of the economy on the environment, the significance of the environment to the economy, and the appropriate way to regulate economic activity to achieve balance among environmental economic and social goals.
Some Distinctions

- Resource Economics: Renewable and Non-renewable resource management
- Environmental Economics: Residual/waste management
- Ecological economics: Transdisciplinary field of study which examines the interactions between economic and ecological systems

What is Environmental Economics?

Economic and Ecological Systems are Fundamentally Linked
Some Definitions: Natural Resources

- Renewable
  - Renewable but Exhaustible
    - Renewable Physical
    - Renewable but Nonexhaustible
  - Nonrenewable

Nonrenewable = No process of replenishment in any meaningful time period
Nonrenewable = Stock

Renewable = Different Units become available at different units of time
Renewable = Flow
Economic Exhaustion versus Technical Exhaustion

Consumptive Use versus Nonconsumptive Use

**Consumptive Use**
- Extract Fund
- Harvest Flows
- Intercept Flow
- Withdraw Fund
Nonconsumptive Use

- Plants Replenish Oxygen
- Viewing Aesthetic Landscapes
- Bird watching
- Knowing something exists

Determinants of Use

- Population
- Technology, Knowledge, Information.
- (Legal and Secure) Property Rights
- Preferences and Culture
- Incomes
- Costs
Policy Questions - EE

- What is the fundamental nature of the environmental problem?
- Should the government "intervene" at all?
- How clean should the environment be?
- How can we achieve the desired environmental quality?

Economic Perspective on Environmental Management

- "Free" markets will generate excessive pollution and overuse environmental services, hence, collective or public intervention is necessary
- How clean the environment should be? Till MB=MC
- Design of policy instruments to achieve environmental goals
- Valuation of non-market goods

Economy and the Environment

- Why do we care about the Natural Environment?
- What services and goods does the environment provide to us?
Services that the Environment provides

- Raw Material Supply
  - Renewable and Nonrenewable
- Natural goods and resources
  - Direct Consumption
  - Life supply (air, water)
  - Aesthetics and recreation
- Receptacle for wastes and residuals (emissions)
- Location in Space
  - Land use

All services are economic goods that people are willing to pay (willing to accept payment) to receive (sell) but may or may not pass through the market. They are valuable none the less.
What is the basic purpose of an economy?

- What is the role of markets?
- What is the role of non-market institutions?
- What is an efficient market?
- How are the economic goods and services distributed?

What is meant by the expression “value is determined by exchange”?

What is the role of prices in a market economy?
What is the role of prices in a market economy?

- Rations
- Communicates (signals)
  - More productivity
  - More substitutes
  - More production
  - More Research and Development (R and D)
- Reflects Values

Physical principles

- Material balance: mass/matter can neither be created nor destroyed.
- Figure 2-1 Barry
  - $M = R_p^d + R_c^d$ [Material Inflow = Waste Discharges]
  - $M = R_p^d + R_c^d = G + Rp - R_p^r - R_c^r$
- What happens to wastes? (dissipation, accumulation, assimilation)
Options to reduce Material Flows

- Reduce M
- Reduce G
- Reduce Rp
- Increase Recycling
- Increase assimilative capacity

Thermodynamics

- First Law of thermodynamics: Energy can neither be created nor destroyed, it can only be transformed from one form to another
- 2nd Law of thermodynamics: Energy conversions are not 100% efficient, i.e. some energy becomes unavailable waste energy (high entropy energy) with every transformation

Are there limits to growth?

- The Pessimists vs the Optimists
Limits to growth

- Can we continue to use the environment as we have been?
- Are there limits to economic growth?
- Spaceship Earth concept
  - We are a closed physical system
  - Economy and humans exist within an ecological system
  - The Cowboy Economy concept

Limits to Growth

- We will run out of resources (materials)
- We will run out of energy
- We will run out of waste sinks (direct and indirect health effects)
- We will disturb the complex web of life and chemicals(ecological system) that would make human life impossible-Nonlinear effects

Limits to Growth

- Pessimists focus on assimilative capacity, resource quantity and quality, distributive issues, scale issues
- Optimists focus on historical record, factors that mitigate scarcity, role of price, induced innovation