1st Teaching Workshop on Environmental Economics

for the Middle East and North Africa

December 5-16, 2005 - ICTP, Trieste, Italy

Water and the Environment

Lecture II.1

Yacov Tsur

The Hebrew University of Jerusalem

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Impacts of water quality

- Affects agricultural productivity➔ land use and values
- Industrial processes are sensitive to water quality
- Affects consumer health
- Affects environmental health
- Quality has many dimension-chemical biological
- The value of quality depends on application location and time

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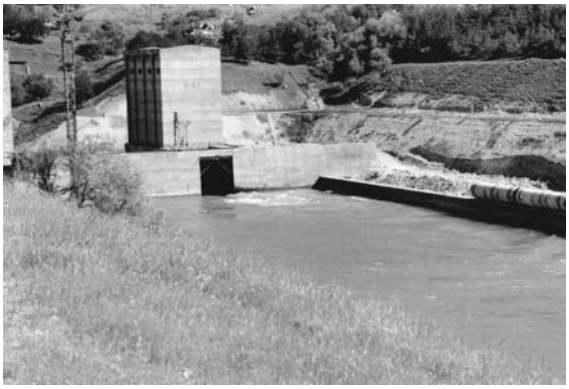
Impacts of agriculture on water quality

- Contamination of ground water
- Run off and flood contamination of surface water (by toxin and nutrients(eutriphication))
- Water logging
- Sea water intrusion
- Diversion of water from environmental applications



Environmental services of wetlands

	Local	National	International
Wildlife habitat	Public Private	Public	Public
Flood control	Public Private	Public Private	Public Private
Water purification	Private Public	Public Private	
Aesthetic value	Public Private	Public	Public
Recreation	Private	Private	Private
Existence	Public	Public	Public

Risk Assessment and Policymaking

- Many policy decisions affect the environment:
  - Regulation of pesticide
  - Design of a dam
  - Water quality projects
- While aimed at improving well-being of consumers and producers, they generate risk ➔
- Must be accounted for in the policy evaluation (ex ante)

Risk Control: Key to Clean Water Policy

- Water health risks are random ➔
  - want to reduce the probability of bad outcomes
  - Contamination
  - Disease
- Economics can provide the science-based risk control policies to address quality issues
- Objective: Maximize Expected economic benefits subject to constraints while accounting for underlying risks

Example

- **Maximize economic welfare** subject to the constraint.
- Probability (Risk < R) > α
  - R = target level of risk
  - α = safety level (measures the degree of social risk aversion)
- α might represent the degree of confidence we have in our risk estimate.
- For example, policymakers may aim to maximize economic surplus given that risk from pesticides cannot exceed $1 million with a 95% probability.

Intertemporal policies and Risk

- Policy impact is uncertain in a stochastic environment
- Need methodologies to evaluate intertemporal policies in an uncertain environment
- There are alternative approaches to risk

Stock Pollution

- Water quality problems may be the result of waste accumulation (eg, salinity, drainage)
- Optimal policy must be designed within a dynamic framework
- The system may or may not reach a steady state
- Bring in issues of adoption of clean technologies
- Failure to address stock accumulation may result in a (catastrophic) collapse of the resource (e.g., Aral sea, seawater intrusion, extinction).