Chapter 2 Lecture - The Economic Approach: Property Rights, Externalities, and Environmental Problems

Econ 2675 – Environmental Economics

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The Human–Environment Relationship

The Environment as an Asset

1. **The environment is an *asset* that provides the economy with resources and acts as a receptacle for the economy's waste.**
2. **The environment is a closed system, as defined by the first and second laws of thermodynamics.**

   A. **First law of thermodynamics—energy and matter can neither be created nor destroyed.**

   B. **Second law of thermodynamics - Known popularly as the entropy law. No conversion from one form of energy to another is completely efficient and that the consumption of energy is an irreversible process.**

Closed system vs. open system

- **Closed system: A system where there are no inputs and no outputs of energy and matter from outside the system**
- **Open system: A system which imports or exports energy or matter from outside**

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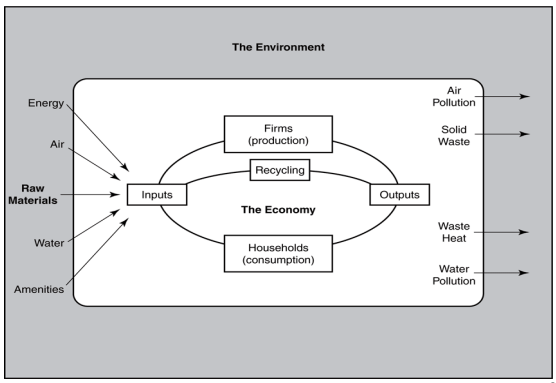
The Economic System and the Environment



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The Human–Environment Relationship

The Economic Approach

1. Positive economics attempts to describe what is.

2. Normative economics deals with what ought to be.

We can give some examples of both positive and normative economics. How about normative decision-making to prevent or mitigate climate change.

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Environmental Problems and Economic Efficiency

Consumer surplus (once again)

- **Consumer surplus is the value that consumers receive from an allocation minus what it costs them to obtain it.**
- **Consumer surplus is measured as the area under the demand curve minus the consumer's cost.**

- **Static Efficiency**
  - **Economic surplus is the sum of consumer's surplus plus producer's surplus.**
  - **An allocation of resources is said to satisfy the static efficiency criterion if the economic surplus derived from those resources is maximized by that allocation.**

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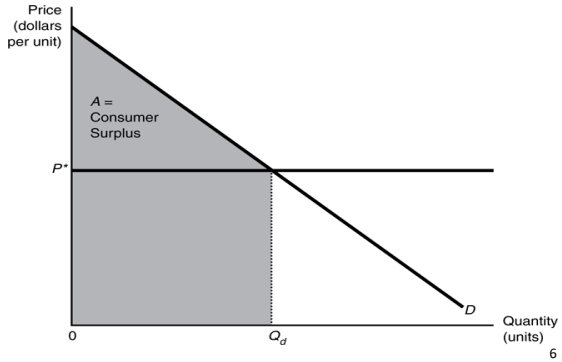
The Consumer's Choice



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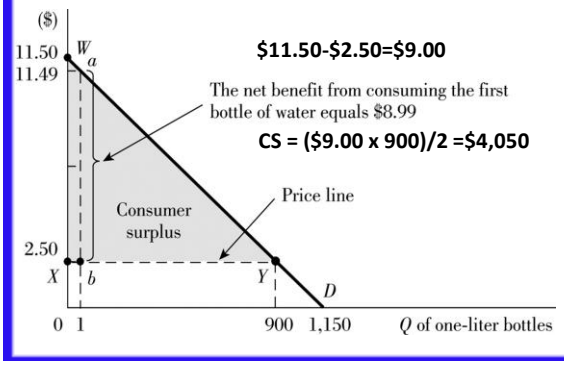
Consumer Surplus
Bottled Water Market



$11.50-$2.50=$9.00

The net benefit from consuming the first bottle of water equals $8.99

CS = ($9.00 x 900)/2 =$4,050

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Environmental Problems and Economic Efficiency

- **Producer surplus (once again)**
  - **Producer surplus is the difference between the amount that a seller receives minus what the seller would be willing to accept for the good.**
  - **Given price P*, the seller maximizes his or her own producer surplus by choosing to sell Q_s units.**
  - **The producer surplus is designated by area B, the area under the price line that lies over the marginal cost curve, bounded from the left by the vertical axis and the right by the quantity of the good.**

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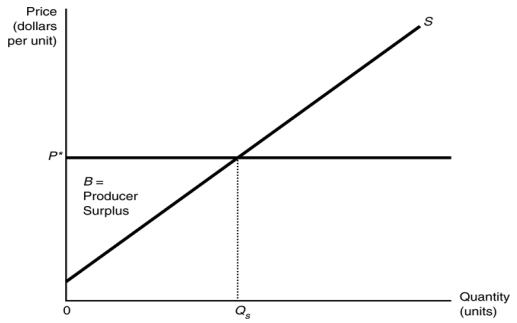
The Producer's Choice



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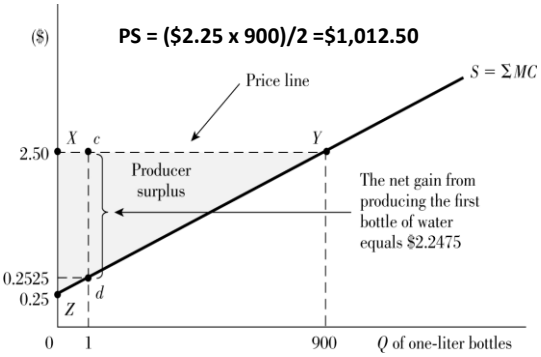
Producer Surplus
Bottled Water Market



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Property Rights

- **In economics, property rights refers to a bundle of entitlements defining the owner's rights, privileges, and limitations for use of the resource.**
- **Property Rights and Efficient Market Allocations**
  - **Either individuals or the state can capture the property rights.**
- **Efficient Property Right Structures**
  - **Exclusivity—All the benefits and costs should only accrue to the owner.**
  - **Transferability—Property rights should be transferred to others.**
  - **Enforceability—Property rights should be secure from seizure or encroachment.**

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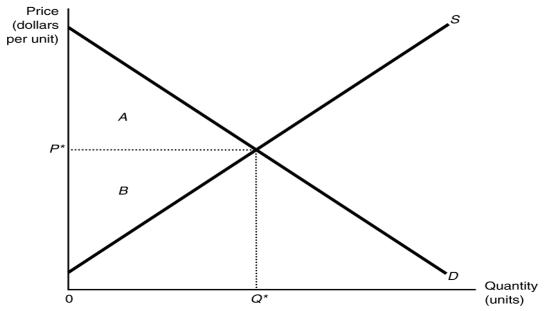
Market Equilibrium



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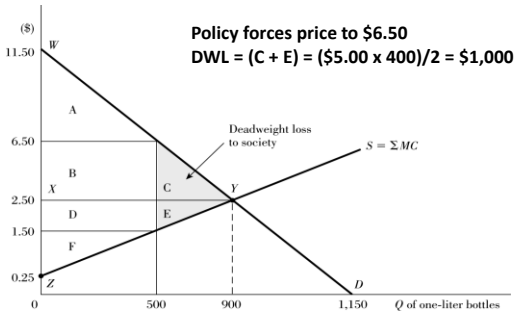
DWL of Price Regulated above P_E Bottled Water Market



Policy forces price to $6.50
DWL = (C + E) = ($5.00 x 400)/2 = $1,000

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Property Rights

- In a system with well-defined property rights, static efficiency is achieved. Self-interested parties make choices that are efficient from society's point of view.
- In the short run, producer surplus is equal to profit plus fixed cost.
- The area under the marginal cost curve is total variable cost.
- In the long run, producer surplus is equal to profit plus rent.

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Property Rights

- Rent is the return to scarce inputs owned by the producer under perfect competition. Long-run profit equals zero and producer surplus equals rent (remember that economic profit is not the same as accounting profit).
- Scarcity rents are the returns that persist in the long-run competitive equilibrium. It is the producer surplus, which persists in the long-run competitive equilibrium.

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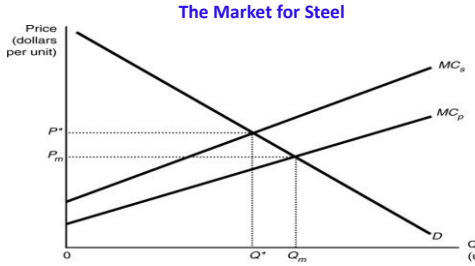
Externalities as a Source of Market Failure

- Externalities exist whenever the welfare of some agent depends not only on his or her activities, but also on activities under the control of some other agent.

The Market for Steel



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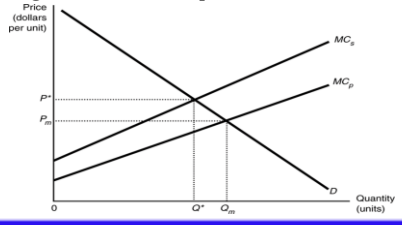
Externalities as a Source of Market Failure

- The output of the commodity is too large.
- Too much pollution is produced.
- The prices of products responsible for pollution are too low.
- As long as the costs are external, no incentives to search for ways to yield less pollution per unit of output are introduced by the market.
- Recycling and reuse of the polluting substances are discouraged due to the cheap external cost.



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Externalities as a Source of Market Failure

Types of Externalities

- External cost (external diseconomy) - It imposes costs on a third party.
- External benefit (external economy) - It imposes benefits on a third party.

- Pecuniary externalities
  - It exists when the external effect comes from altered prices.
  - Example: an influx of city-dwellers buying second homes in a rural area can drive up house prices, making it difficult for young people in the area to get onto the property ladder.

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Shrimp Farming Externalities in Thailand

In the Tha Po village on the coast of Surat Thani Province in Thailand, more than half of the 1100 hectares of mangrove swamps have been cleared for commercial shrimp farms. Although harvesting shrimp is a lucrative undertaking, mangroves also serve as nurseries for fish and as barriers for storms and soil erosion. Following the destruction of the local mangroves, Tha Po villagers experienced a decline in fish catch and suffered storm damage and water pollution. Can market forces be trusted to strike the efficient balance between preservation and development for the remaining mangroves?

Calculations by economists Sathirathai and Barbier (2001) demonstrated that the value of the ecological services that would be lost from further destruction of the mangrove swamps exceeded the value of the shrimp farms that would take their place. Preservation of the remaining mangrove swamps would be the efficient choice.

Would a potential shrimp-farming entrepreneur make the efficient choice? Unfortunately, the answer is no. This study estimated the economic value of mangroves in terms of local use of forest resources, offshore fishery linkages, and coastal protection to be in the range of $27,264–$35,921 per hectare. In contrast, the economic returns to shrimp farming, once they are corrected for input subsidies and for the costs of water pollution, are only $194–$209 per hectare. However, as shrimp farmers are heavily subsidized and do not have to take into account the external costs of pollution, their financial returns are typically $7,706.95–$8,336.47 per hectare. In the absence of some sort of external control imposed by collective action, converting mangroves to shrimp farming would be the normal, if inefficient, result. The externalities associated with the ecological services provided by the mangroves support a biased decision that results in fewer social net benefits, but greater private net benefits.

Source: Sathirathai, S., & Barbier, E.B. (April 2001). Valuing mangrove conservation in southern Thailand. *Contemporary Economic Policy, 19*(2). 109–122.

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Externalities as a Source of Market Failure

- Open-access resources and "tragedy of the commons"
- "Common-pool" resources are shared resources characterized by nonexclusivity and divisibility.
  - Nonexclusivity implies that resources can be exploited by anyone.
  - Divisibility means that the capture of part of the resource by one group subtracts it from the amount available to the other groups.

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The Tragedy of the Commons

Use of the commons is below the carrying capacity of the land. All users benefit.

If one or more users increase the use of the commons beyond its carrying capacity, the commons becomes degraded. The cost of the degradation is incurred by all users.

Unless environmental costs are accounted for and addressed in land use practices, eventually the land will be unable to support the activity.

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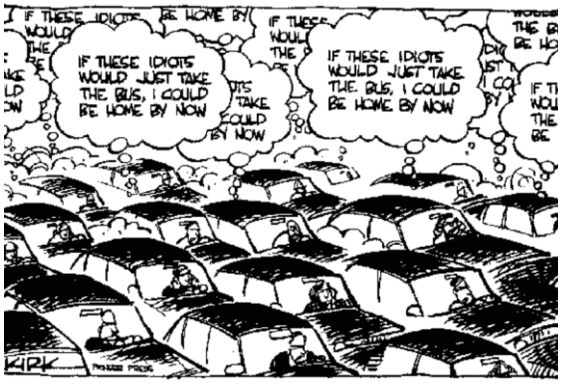

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Externalities as a Source of Market Failure

- **Public Goods - both consumptively indivisible and nonexcludable.**
  - **Nonexcludability refers to a circumstance where, once the resource is provided, even those who fail to pay for it cannot be excluded from enjoying the benefits it confers.**
  - **Consumption is said to be indivisible when one person's consumption of a good does not diminish the amount available for others.**
  - **Examples include charming landscape, clean air, etc.**
  - **It also includes *Biological diversity* or the amount of genetic variation among individuals within a single species and the number of species in a community.**

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Externalities as a Source of Market Failure

With Public Goods we have:

- **Efficient level of diversity**
- **The efficient allocation maximizes economic surplus, which is represented geometrically by the portion of the area under the market demand curve that lies above the constant marginal cost curve.**
- **The allocation that maximizes economic surplus is Q*, the allocation where the demand curve meets the marginal cost curve.**

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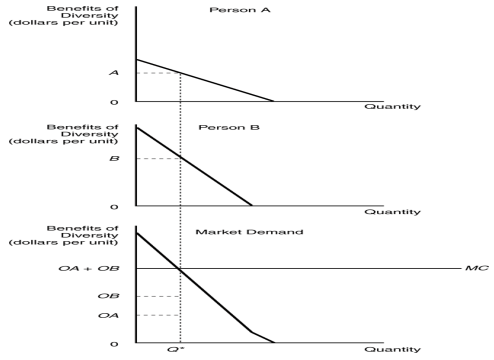
Efficient Provision of Public Goods



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Externalities as a Source of Market Failure

- Imperfect Market Structures
  - Monopoly: when product is sold by a single seller
    - Monopolies will supply too little of a good at too high a price.
    - At the monopoly output, marginal benefits are greater than marginal costs. Net benefits are not maximized and there is a deadweight loss.
  - We may have cartel - a group of producers who form a collusive agreement to gain monopoly power.

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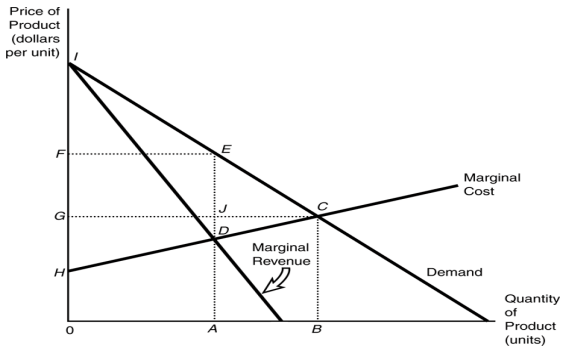
Monopoly and Inefficiency



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Factors that Contribute to Inefficient Allocation

- A free rider is someone who derives benefits from a commodity without contributing to its supply.
- Asymmetric Information
  - It refers to a situation where one or more parties have much more information than the others.
  - Asymmetric information creates problems for the market when it results in a decision-maker knowing too little to make an efficient choice.
- Government Failure
  - Rent seeking: the use of resources in lobbying and other activities directed at securing protective legislation.
    - Examples include agricultural producers seeking price supports and consumer groups seeking subsidies.

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The Pursuit of Efficiency

- Private Resolution Through Negotiation—the Coase Theorem
  - The courts: property rules and liability rules
    - Not well-defined property rights corrected by courts
- The Coase Theorem
  - When negotiation costs are negligible and affected parties can freely negotiate, the entitlement can be allocated by the courts to either party and an efficient allocation will result. Only the distribution of costs and benefits among the effective parties is changed.

https://www.youtube.com/watch?reload=9&v=BcGoPQe3-ls

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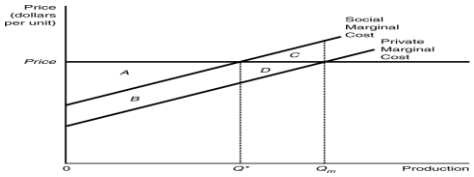
Efficient Output with Pollution Damage



- A downstream firm hurt by an upstream polluter could negotiate or bribe the upstream polluter to reduce pollution. A resort, for example, may be willing to pay C + D. They would experience damage reduction from the decrease in production from *Qm* to *Q**.
- Let's assume that the bribe is equal to this amount. Would the steel company be willing to reduce production to the desired level?
- If they refused the bribe, their producer surplus would be *A* + *B* + *D*. If they accepted the bribe, their producer surplus would be *A* + *B* plus the bribe, so their total return would be *A* + *B* + *C* + *D*. Clearly, they are better off by *C* if they accept the bribe.
- Society as a whole is better off by amount *C* as well since the economic surplus from *Qm* is *A* – *C* and the economic surplus for *Q** is *A*.

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A Simple Question

Five fishermen live in a village and have no other employment or income earning possibilities besides fishing. They each own a boat that is suitable for fishing, but does not have any resale value. Fish are worth $5 per pound and the marginal cost of operating the boat is $500 per month. They all fish in a river next to the village, and they have determined that when there are more of them out there on the river fishing, they each catch less fish per month according to the following schedule:

Boats	Fish Caught per Boat (pounds)
1	200
2	190
3	175
4	155
5	130

If each fisherman acts in his own best interest, will he continue to operate his boat each month? If so, how much income will he earn per month?

If the fishermen band together and act as a group, how many boats will they choose to operate? If income is divided evenly, how much will each fisherman make?

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The Coase Theorem: here is a simple bargaining example.

There is a factory that is dumping toxic waste into a river where a resort is located downstream. At the moment the factory is not filtering the water that it dumps into the river. There is a filter it could install that would remove a significant amount of the toxic elements from the water before it is dumped in the river. The factory and the resort have each assessed the situation and come up with the following data:

Gains to:	No Factory	Factory with filter	Factory with no filter
Factory	$0/day	$700/day	$800/day
Resort	$400/day	$250/day	$100/day

If the factory is given ownership of the river, what choice will it make? How much would the resort be willing to pay to get the factory to make another choice? Will the factory accept?

If the resort is given ownership of the river, what choice will it make? How much would the factory be wiling to pay to get the resort to make another choice? Will the resort accept?

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