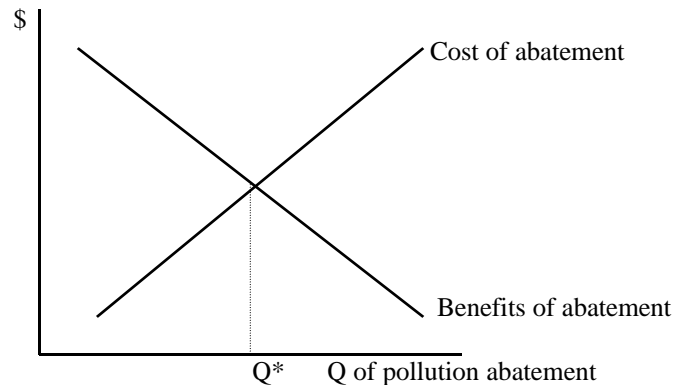


A number of environmental concerns face the third world:

1. Air pollution in the cities is extremely bad, much worse than in US
2. Much of the water is dangerous or undrinkable. In some countries, cholera is still a concern.
3. Deforestation is occurring, particularly in Africa.
4. The rainforest is being cut down, leading, many scientists believe, to the greenhouse effect.

This is an economics class. We can't solve all of the world's problems, but we can address the economist's view. A few salient points:

1. Benefits must equal costs.
2. It is not feasible to eliminate all pollution, nor is pollution purely a problem of industrial societies. Many "pollution" and public health problem existed before industrialization.
3. The highest income countries have the lowest levels of pollution. This is not just because pollution has been shunted aside.
4. Pollution has only become a global problem, or been recognized as a global problem in the last few years.



The question for economists is how to reach the optimal level of pollution. There are at least 2 approaches:

1. The Chicago school emphasizes property rights and the role of the private sector.
2. Most economists emphasize government intervention and the notion of externalities.

Sustainable Development: Many Social scientists and environmentalists argue that the current rate of resource extraction and pollution is unsustainable. In many ways their arguments are similar to Malthus. They may be right. One shouldn't assume that because Malthus was wrong 200 years ago that these neo-Malthusians are wrong today. One way to look at economic growth is to look at depletion of natural resources.. We normally have:

$$\text{NNP} = \text{GNP} - \text{depreciation}$$

$$\text{ANNP} = \text{GNP} - \text{capital depreciation} - \text{natural depreciation}$$

where: ANNP= adjusted NNP

If resources are used to fast a country is not becoming more wealthy. The counter-argument is that new technologies will soon be found to use resources in the future more efficiently.

Property rights approach- According to this approach pollution is created when property rights are ill defined. For example, if I own a lake in my back yard would I pollute it?

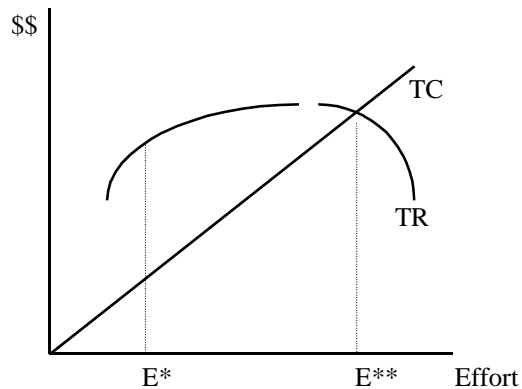
Public Goods are generally under-provided because individuals can free ride.

A public good is excludable and exhaustive.

Example: A lighthouse.

Fisheries and other non-renewable resources: the best application of the property rights approach. The world faces a serious problem with over-fishing. Ex: Some fishing beds off of Cape Cod had to be closed down because of over-fishing. The general problem is often referred to as the **Tragedy of the commons**. If land is free in a common public area, people will continue to graze their cattle too much.

Do property rights have to be completely private? No. Studies show that traditional communities often solve the tragedy of the commons by social sanctions or other restrictions. When traditions fall apart, it is much more difficult to solve these problems.



In the above diagram, if there are no property rights, then fishermen will fish until $TR - TC = 0$, but if the commons or the fishery is owned by the fishery, then it makes sense only to fish up to E^* . In other words, without property rights, it makes sense for others to continue fishing since if they don't someone else will. By the way, you can apply the same ideas to forestry. If a firm owns its own forest, it will not completely deplete the trees.

The theory of externalities is a more widely accepted view. **Externalities occur whenever a third party is effected in a market transaction.** If a third party is positively effected, we call it a positive externality. Example: I come up with a new milkshake that also cures cancer.. This raises your property values. A negative externality hurts others. Example: Pollution.

Social Cost + Private Cost + Externality

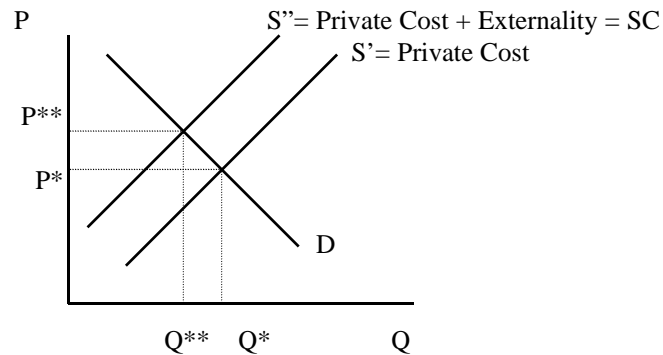
So, for a **positive externality**, the social cost is less than the private cost. For a **negative externality**, the social cost is more than the private cost

How does one deal with an externality? The government can deal with it in several ways:

1. Emissions controls- like autos; problem inefficient grandma example
2. Prohibition of certain materials like CFC's- may work in some cases
3. Banning sale of certain products

4. requiring certain technologies be used, i.e., catalytic converters
5. taxing pollution

In general economists favor effluent taxes because they give the polluter a choice as to the most efficient way of eliminating pollution. If the cost of eliminating pollution is sufficiently high, polluters may choose to pay the tax. If the tax is equal to the social cost, then the solution is efficient.



In the above diagram, the effluent tax internalizes the externality and raises the private cost to the social cost. Price goes up, Quantity supplied and demanded falls.

Problems with an effluent tax. In general effluent taxes are not popular. Is this because economists are wrong or because people are stupid not to listen to us; perhaps a bit of both.

1. Taxes are unpopular. Quantity controls represent a hidden tax that is more politically palatable. Since people have to pay tax, why not tax bad stuff? (It may be regressive like cigarette taxes.)
2. People don't understand effluent taxes.
3. The outcome may be unknown.
4. Monitoring costs may be high.

For the above reasons we rarely see effluent taxes.

The market for pollution. One potential solution which gives the same answer is to allow trading in the right to pollute. The US does this with air pollution from large utilities in the midwest. Each plant is given a "right" to pollute so much. It can sell this right to another polluter.

Why would a utility want to sell this right to pollute? A: It will sell it to another firm whose costs of prevention is higher thus allowing a more efficient reduction of the same pollution.

Example: The State of California has essentially given me a right to pollute with my car. Some cars have more of a right to pollute? (Why? Hint: What is the age of the car.) Suppose I can reduce NO_x by 50ppm for \$100 and my neighbor can reduce it for \$50. It makes sense for me to buy his right to pollute. We can get the same reduction for less money. Both are better off and society is happy. (Q: What will the price be?)

How not to reduce pollution. The Clean Air act and coal. Explain the options.

1. Use low sulfur coal.
2. Clean dirty coal.
3. Install scrubbers.

Three above is the most costly but is inevitably the answer. Explain the politics.

Problems with implementing a policy in the 3d World.

1. Government may not have the power or political will to impose any controls.
2. Countries may be too poor to care.

Brazil is a classic case of failed policy. Several economic studies show that it actually subsidized destruction of the rain forest. Even though it is not in the long run interest of the country to do so even with very high discount rates. Indonesia grants logging rights for 220 years; this is bad policy. (Why?)

Some developing countries subsidize energy imports.

Do the poor contribute most? Some have noted that the worse polluters in the world are the rich and the very poor. The poor contribute to deforestation. Others argue that the poorest can manage land if they are given the appropriate property rights.

What is to be done? What can developing countries do?

1. Eliminate subsidies on energy, water, etc which generally benefit the rich and encourage wasteful use of scarce resources.
2. Encourage community involvement at local level.
3. Define property rights clearly, particularly for renewable resources, like forests.
4. Improve welfare of the poor.
5. Raise the economic status of women.
6. Tax large industries

What can developed countries do?

1. Tax imports which destroy the rainforest or implement a "carbon tax."
2. Give aid for pollution control.
3. Debt for nature swaps.
4. Show commitment to reducing their own pollution.