

The Science of Economics

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The environment consists of natural resources which contribute to our well being by their very existence, rather than by being used up. These resources are of two types: renewable, such as wildlife and water, and non-renewable, such as oil and minerals. Environmental economics consists of the utility gained by using resources, including the differentiation of short-run and long-run utilities, the maximization of the utilities from a stock of resources, the calculation of benefits and costs, the property rights associated with natural resources, and ways of paying for using and abusing the environment.

In Chapter 1 it was shown that the Universal Ethic endows humanity with the common ownership of natural resources. This ownership does not consist of all rights to natural resources, but the right to their benefits, which is economically manifested in land rent.

1. Minerals

The use of non-renewable resources such as minerals necessarily involves the using up of the materials. The problem of the scarcity of non-renewable resources is resolved automatically by the free market. As a resource gets used up and becomes increasingly reduced in supply, its price will increase. This higher cost will induce the users of the resource to economize on its use, including recycling it if possible, and also to seek out substitutes. The higher the price, the less of the good will be demanded, and so as supplies become used up more and more, the ever higher price will induce less usage.

With a community, ultimately humanity, considered the proper owner of the rents of natural resources, there are three basic ways of obtaining the rent.

- The first is "ex ante" or prior to mining. A company bids and pays for the opportunity or franchise of both the exploration and extraction of the oil or minerals.
- The second method is "ex post" or after mining. The firm pays a fee based on the amount of resource extracted (e.g. per ton). This is also called a "severance" charge.
- The third way, also after mining, is to take a percentage of the profits from the operation.

None of the methods by itself takes the rent or accurately measures it, since in mining it is not easy to separate the rent from the entrepreneurial profit, so a combination of the three is usually the best way to obtain the rent.

Liquid resources, such as water and oil, pose an extra problem, since if for example an underground water supply is divided among several plots of land, each owner will want to drain away as much as possible, since the loss is borne by all the owners together. An extraction fee is therefore needed to prevent such exploitation.

2. Renewable resources

Renewable resources do not need to be used up, so their economics is different. The sustainable use of a resource, such that the same amount or greater remains for future use, does not have a scarcity rent, although it can have a locational rent. The using up of the resource does involve a scarcity rent and should have a charge, as with non-renewable resources, but in this case, there can be damage to future generations because some resources do not have an established market and because many of the wildlife resources are very fragile and endangered.

Much of this destruction is often not the result of market processes but is caused by subsidies. For example, agricultural subsidies induce farmers to cultivate marginal land that would otherwise be left in a natural state. This land is typically artificially fertilised, so not only does wildlife habitat get destroyed but more pollution is created by protectionist policy.

3. Pollution

The oceans and the atmosphere are a type of common pool, although we can also separate out some local pollution. Since the oceans are part of our natural resources, or economic land, those who dump pollutants into the seas are obtaining a benefit from the use of this land, and thus gain a rent. Humanity as the owner of the oceans and atmosphere is therefore entitled to collect this rent, which ideally would compensate all future generations for the damages. Charging a fee for pollution also compensates humanity for the damage done, as is required by the market process. However, it is difficult to estimate the amount of damage committed by the pollution of a large area such as the upper atmosphere or the oceans, especially since the damage lasts into the indefinite future.

The central problem is that the government policy has not marketized most of our air and water, either making it private or charging rent. Users and abusers of the environment have not paid for the social cost, the damage being done to health and the preservation of the global climate. By treating the atmosphere and oceans as free goods, there was no incentive to protect it. Municipalities also are able to use rivers and oceans as dumps for sewage.

The ideal solution is to have the polluter pay for the use of the environmental service. The "polluter pays principle" was adopted by the OECD, the Organization for Economic Cooperation and Development, in 1974. This intergovernmental organization recognized that the marketization of the environment requires an international agreement, so that firms which use costly anti-pollution devices do not suffer a competitive disadvantage. A pollution charge would also encourage inventions and investments in anti-pollution technology and in less-polluting techniques such as solar energy.

Some proposed environmental taxes do not directly charge for pollution, but for products whose usage is currently polluting. For example, "carbon tax" has been proposed, based on the carbon content of the fuel used: a higher charge for coal than for oil and a lower one still for natural gas. But this is more directly a tax on consumption. It is economically more efficient and morally less coercive to place a charge directly on the pollutant, such as carbon monoxide, in proportion to its damage. Such a charge would not be a tax in substance, but a rent and fee for the use of environmental land.

There are at least three ways to set such a pollution charge.

- The first method is to measure the economic impact of environmental damage, and set the charge equal to that cost. For example, air or noise pollution can reduce real-estate values. When direct measurements are not available, one can use the contingent valuation approach. People are asked either what they would pay for an environmental benefit or what they are willing to receive as compensation for some reduction in environmental quality.
- The second method is to assume that the total damage from pollution is infinite (considering the effects on future generations for all time to come), so any amount charged will but compensate a little for the damage. The charge is then determined by budgetary desires. The total amount of revenue obtained can be a budget residual or difference. Suppose the total budget is B , and the revenues obtained from site rents and mineral extractions and other rents is R . If R is less than B , then the total pollution charges can be $B - R$. We then designate a list of pollutants and their relative damage per ton, adding up the total ton-damage. We then divide the amount of funds to raise ($B - R$) by the ton-damage to get the charge per ton. Here is an example.

Suppose that $B - R$ is \$1 million. We have two pollutants, chlorine and arsenic, each consisting of 100 tons per year. Arsenic is nine times as damaging as chlorine (as a hypothetical example). The total ton-damage is 100 (for the chlorine) + 9×100 (for the arsenic) = 1000. The charge per ton is \$1 million divided by 1000, which equals \$1000. So chlorine would be charged \$1000 per ton and arsenic \$9000 per ton. The effect of the charge would be to reduce the pollution, and so the fee per ton could be increased the next period, which would then reduce pollution even more.

- The third way to charge would be to treat the ocean or atmosphere as private property, and maximize the revenue for dumping into it. For example, suppose some corporation were assigned ownership of the North Atlantic ocean, with rights to collect fees for pollution dumping. The firm would set the rates per pollutant, given some list of pollutants and relative charges by a governing authority. It would try to maximize its profits and would set a rate that would most likely be so high it would substantially reduce the pollution. This company in turn would pay its rent, which would be most of its revenues, to some governing authority, such as the United Nations, providing it an independent source of revenues. If the revenue is greater than the budget of the agency, the funds could be distributed to the member nations. To keep the process efficient and honest, provision should be made for members to be able to secede from the organization and form alternative international organizations which would also share this rent.

A combination of these methods would include the natural environment in a global market economy, so that the social costs of enterprise would be borne by those obtaining the benefits.