

Section Chapter 15: Environment

1 Sustainable development and the environment

The chapter analyzes environmental issues from several different perspectives:

1. **Externalities** leading to market failures
2. **Incomplete property rights** & collective action for common property resource management
3. Many environmental services are **public goods** that will be under-provided by the market
4. **Private discount rates in excess of social discount rates**, so that private individuals under-value the future
5. **Sustainability objectives** not recognized by society
6. **Differential valuation of income and environmental amenities in poor and rich countries**
7. **Missing markets for environmental services**

2 Negative production externality

Figure 1: Negative Production Externality

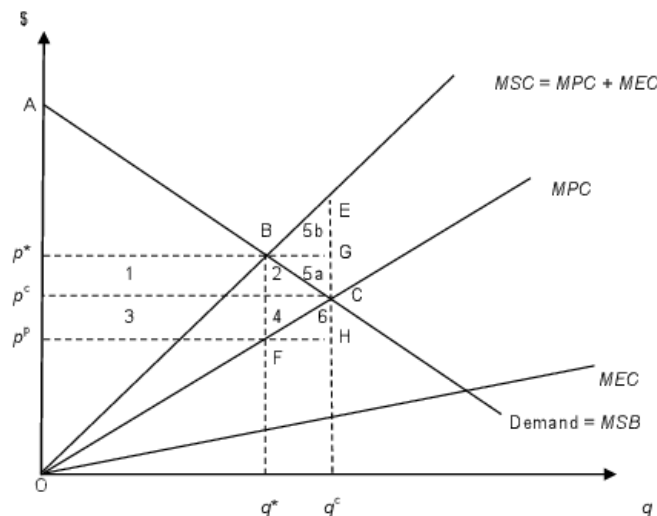


Figure 2. Negative production externality

In the above figure, MSC (Marginal Social Cost), MPC (Marginal Private Cost)= supply curve, MEC (Marginal Environmental Cost). The competitive market solution is (q^c, p^c) , where $MPC=MSB$ (Marginal Social Benefit). However, with each unit of production, there are environmental costs (externalities) generated by the production that isn't borne by producers or consumers directly.

The policy problem is to design a policy tool to take the market equilibrium to the social optimum (MSC=MSB). The optimal tax or subsidy level should be equal to the marginal environmental cost at the optimal level (i.e. $p^* - p^b$).

3 Coase Theorem

The Coase theorem assumes three conditions: 1) property rights over pollution are clearly assigned, 2) full information about MB of pollution and MC of pollution for the two parties, and 3) transaction costs in negotiating are low.

Under these conditions, the Coase theorem says that a private, negotiated solution over how to pollute and produce will be maximally (locally) efficient, regardless of how property rights (such as rights to [pollute or enjoy] clean air) are divided. Applying the separability theorem again, well-defined property rights ensure efficiency (production and pollution reach the social optimum), but the *distribution of benefits* depends on who holds those property rights.

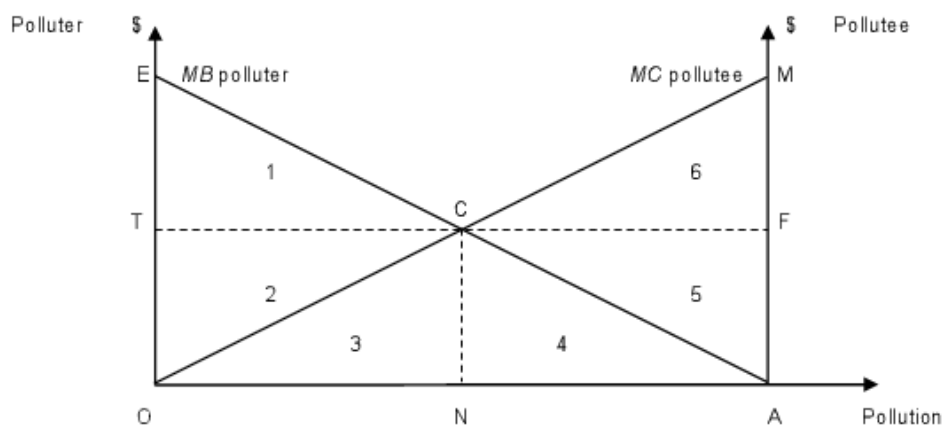


Figure 4. Private bargaining over pollution: The Coase theorem

Case 1: The polluter has the right to pollute

Initial situation:

Pollution occurs until MB of pollution for the polluter = 0 (=OA)

Polluter welfare = 1+2+3+4

Pollutee welfare = -3 - 4 - 5 - 6

Social welfare = (1+2) - (5+6)

Outcome after negotiation: The pollutee pays the polluter \$F per unit of pollution reduction until MC = MB.

Pollution = ON

Polluter welfare = (1+2+3) from production+(4+5) from payment > 1+2+3+4, Gain = 5

Pollutee welfare = -3 from pollution, -(4+5) from payment > -3 - 4 - 5 - 6, Gain = 6

Social welfare = 1+2

NSG (net social gain) = Social welfare after - Social welfare before = 5+6>0

Who appropriates most of the NSG? The owner of the right to pollute: the polluter.

Case 2: The pollutee has the right to clean air

Initial situation:

Pollution = 0

Polluter welfare = 0
 Pollutee welfare = 0
 Social welfare = 0

Outcome after negotiation: The (polluter/pollutee) pays the (polluter/pollutee) \$X per unit of pollution (reduced/emitted) until $MC = MB$.

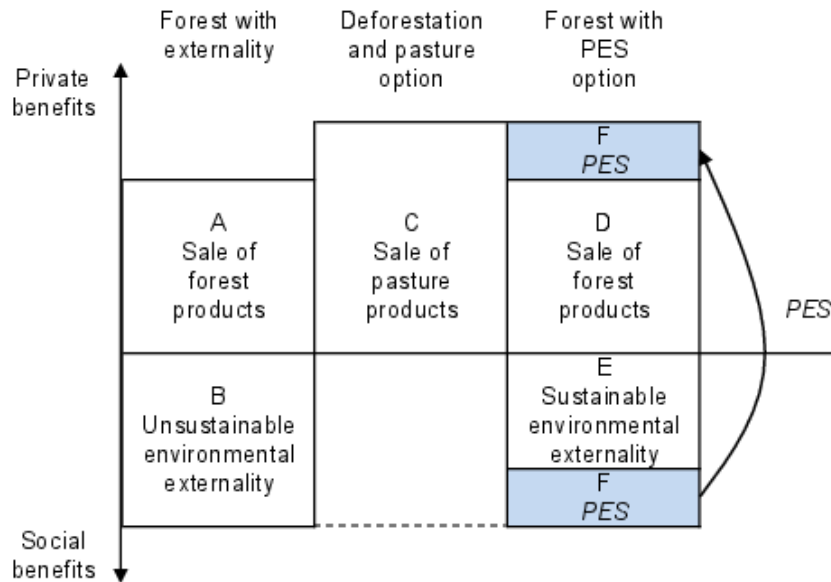
Pollution = ON
 Polluter welfare = _____, Gain = _____
 Pollutee welfare = _____, Gain = _____
 Social welfare = _____

NSG (net social gain) = Social welfare after - Social welfare before = _____ > 0

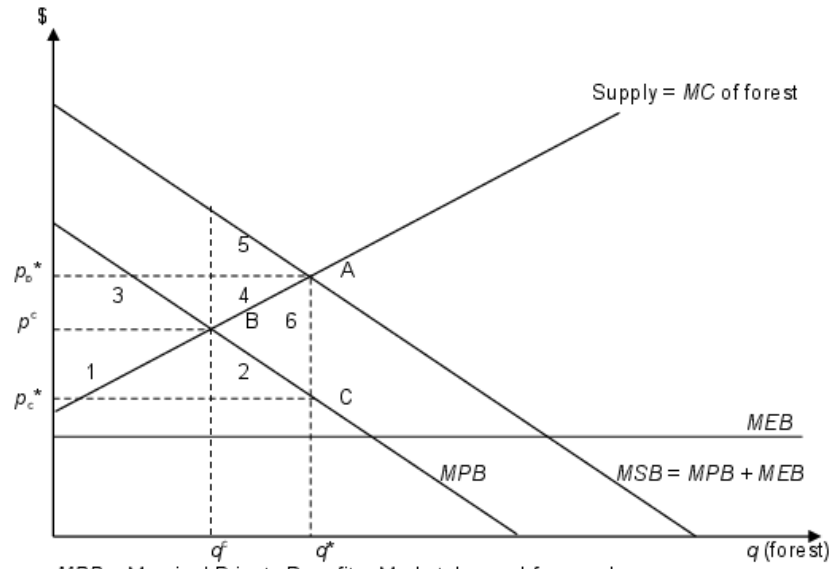
Who appropriates most of the NSG? _____

4 Payments for environmental services

In our short reading “Better REDD than Dead,” we see that cap-and-trade has built a market for “environmental services” preserving existing forests. Payments for Environmental Services (PES) are an innovation that tries to create a market for positive externalities where there have historically been missing markets. For example, we can think of the carbon sequestering benefits of a forest, where the land could be kept under forest to gain private benefits from wood sales or cleared for even greater private benefits through farming or grazing animals.



In terms of marginal costs and benefits, this looks like:



MPB = Marginal Private Benefit = Market demand for wood
 MEB = Marginal External Benefit = Unpaid environmental service
 MSB = Marginal Social Benefit = Social demand for wood and environmental service