Chapter 28

DOLLARS AND ENVIRONMENTAL SENSE

Case Study – Whale Burgers or Whale Conservation or Both?

● Cultural mores differ widely as illustrated by the fact that in 2005 fast-food chains in Japan began to offer whale-meat burgers, ignoring pressure from the IWC and nations like the U.S. that oppose whaling. The IWC has allows a limited whale catch by indigenous people who have a tradition of whaling for their sustenance. Whaling has been a subject of international debate for decades.

ECONOMICS OF ENVIRONMENT ISSUES

28.1 THE ECONOMIC IMPORTANCE OF ENVIRONMENT

●The U.S. presently spends about $170 billion, including spending by consumers, to deal with pollution. This investment yields comparable health and other benefits. Valuation of benefits involves both tangible and intangibles, the latter being far more difficult to quantify.

28.2 THE ENVIRONMENT AS A COMMONS

● Natural resources are often not used in a sustainable manner. This can be due to the low growth rate of a biological resource (it is more profitable to slash and burn and move on than to live on the sustainable growth). A second reason, termed the tragedy of the commons by Garrett Hardin, is that the personal share of the profit from a shared resource is often greater than a share of the resulting loss. A commons is land or other publicly owned resource available for private use. Public land used for grazing, public forests, sea beds, the atmosphere (used to dispose of toxic air pollutants), and fisheries are some examples. The private user maximizes short-term personal gain by depleting the resource to the detriment of the other owners, the public. There are many examples of private exploitation of public resources, including recreation. There is no easy solution to this problem.

28.3 LOW GROWTH RATE AND THEREFORE LOW PROFIT AS A FACTOR IN EXPLOITATION

● Take the exploitation of the whale population for whale oil as an example. The product is the oil, and the sustainable production of the product is a function of the growth rate of the population, which in the case of whales is very low. An alternative to sustainable yield is to maximize short-term profit. To illustrate the alternative economic strategies, if the value of the oil in the whale population was $100 million and the sustainable production 5% per year, than the whalers could harvest $5 million annually. But they must pay for upkeep on the ships and salaries, which reduces the profit. Alternatively, if the whalers harvested the entire $100 million of standing stock, they could invest this in CDs and stocks and probably would earn 5% or more, without the added cost of paying a crew and boats. You see the problem.

28.4 EXTERNALITIES

● An **externality** is an indirect cost that is not normally accounted for in the cost-benefit analysis of producers. They are costs that don't show up on the books with a price tag. Air pollution is one example. Accounting for externalities is problematic. First, using the example of air pollution, what is the cost of this? Second, who should bear the burden of these costs?

28.5 NATURAL CAPITAL, ENVIRONMENTAL INTANGIBLES, AND ECOSYSTEM SERVICES

● Ecosystems provide a number of **public service functions** that have great value and are free. Water and air purification are examples. The ecological systems that provide these benefits, valued at $3 trillion to $33 trillion annually, are referred to as natural capital. Bees pollinate $20 billion worth of crops in the U.S.
● Some of the value of nature is difficult to quantify, like beauty, which provides inspiration for art and music, mental health and so on.

28.6 HOW IS THE FUTURE VALUED?

● In economic terms, a dollar of profit now is worth more than a dollar of profit in the future. The future value depends on the time period. If someone offers to sell you a dollar of goods today, you would pay a dollar. If they offered to sell you the goods at some future date in exchange for money today, you would pay less than $1, depending on how long you had to wait for the goods. To be exact, the present value of a single sum (PV) is equal to the future value (FV) discounted by the current interest rate *i*:

$PV = FV(1+i)^{-n}$, where n is the number of compounding periods or years until the goods are delivered. For example, with a 5% annual interest rate, $1 of goods delivered 10 years from today is worth $\$1(1+.05)^{-10}$ or 61 cents today.

The present value of a cash flow stream (nature provides continuous benefits rather than a single sum) is equal to the sum of all future values discounted to the present:

$PV = \varphi\ CF_t(1+i)^{-t}$ So $1 of goods delivered every year for 10 years would be worth today: $PV = \$1(1.05)^{-1} + \ldots \$1(1.05)^{-10} = \$7.72$

Thus, the future existence of nature's capital (the ability to purify water, the existence of whale oil, etc) has a value today, but the question is how much are we willing to pay for it? It is not really as simple as the foregoing calculations. As a nation accumulates wealth, the value goes up. If we are wealthy and well fed, we place more value on a clean environment for our children and grandchildren than we would if we were starving.

28.7 RISK-BENEFIT ANALYSIS

● Risk-benefit analysis is the quantification of the risks of an action evaluated against its benefits. We all do this subconsciously. For example, most of us choose to drive a car even thought the lifetime risk of dying in a wreck (1 in 100) is quite high compared to other activities (see Table 28.1). We must think the benefit of driving is high. On the benefit side, we consider not only the benefit of not dying, but the benefit of a higher quality of life. For example, the risk of dying from indoor air pollution of far greater than

that of outdoor air pollution (Table 28.1), yet we spend a great deal on controlling outdoor air pollution. How much should we pay to reduce risk? How much are we willing to pay to save a life? According to a study by the Rand Corporation, we are willing to pay about $32,000 per life saved, or $1,600 for each additional year of longevity. Like it or not, we cannot eliminate risk, but we can minimize it for a price.
● The cost of pollution control per family is relatively low, $30-$60 per year for an average family. The benefits are many, including a reduction in the risk of asthma by 3% and a 10-15% reduction in bronchitis. Based on the costs of pollution (direct health effects, lost work days, lower productivity, etc.), pollution control appears to be cost effective and to have net economic benefits.

A CLOSER LOOK 28.1: Risk-Benefit Analysis and DDT

●The history of the use of DDT illustrates the difficulty of completely eliminating a pollution risk and with correctly evaluating the risk. The benefits of reducing a disease risk (malaria) were recognized immediately, but the risks only became apparent later. Now, complete elimination of DDT residues from all environments and from organisms does not seem feasible.

28.8 GLOBAL ISSUES: WHO BEARS THE COSTS?

● Developing nations did not share in the economic benefits of the tragedy of the commons (e.g. burning of fossil fuels during the last two centuries), but they are sharing in the current disadvantages. Developing nations believe that industrial nations should accept most of the future costs. If we must reduce the consumption of fossil fuel to prevent future climate problems, who should pay?

28.9 HOW DO WE ACHIEVE A GOAL? ENVIRONMENTAL POLICY INSTRUMENTS

● Any society has three tools or **policy instruments** that ii can use to achieve its goals. These include **moral suasion** (social pressure), **direct controls** (regulations established by law), and **market processes**. The relative success of these three policy instruments varies (see Table 28.4). The three are not mutually exclusive and can interact.
There are three common methods of direct control of pollution: 1) setting maximum levels of emissions, 2) requiring specific procedures and processes that reduce pollution, and 3) charging fees for pollution emission. Each method has advantages and disadvantages.
● The **marginal cost** of pollution control is the cost of reducing one additional unit of pollution. With pollution control, the marginal cost increases rapidly as the percentage of reduction increases. For example, the first 20% of pollution reduction might be rather inexpensive, but the last 20% is likely to be very expensive.
● In every environmental matter there is a desire to maintain individual freedom on the one hand and to achieve a specific social goal on the other. Often individual freedoms are sacrificed for the greater good.

A CLOSER LOOK 28.2: Making a Policy Work: Fishing Resources and Policy Instruments

!The oceans outside national territorial waters are commons, and the fish and other resources in them are common resources. Nations have moved to extend their territorial limits so that they can more effectively manage their fisheries resources. The management options include 1) establishing catch quotas for the entire fishery, allowing anyone to fish until the quota is reached, 2) restrict the number of licenses, but allow each licensed fisherman to catch many fish, 3) tax the catch or the effort (e.g. number of boats, or boat-days), and 4) allocate fishing rights (a quota per fisherman). Economic tools can be used to determine which methods work best.

CRITICAL THINKING

● Both over-fishing and pollution have been blamed for the decline in commercial fisheries off the NE coast of the U.S. Attempts to regulate fishing have generated disputes with fishermen. This is a classic contest between short-term and long-term interests. Fishermen blame pollution, but scientific studies point to over-fishing as the cause of the decline. In the absence of any control, would the fishery be completely destroyed? How is the future value of the fishery relevant to the arguments on both sides? What management option would work best, considering both the economics and the ecology of the resource?

● In 1986 David Lucas paid $ 975,000 for two beachfront lots on the Isle of Palms in South Carolina, on which he intended to build single-family homes. In 1988, however, the South Carolina Legislature enacted the Beachfront Management Act, which had the direct effect of barring Lucas from building on his two parcels. Lucas filed suit in the SC Court of Common Pleas, contending that the Beachfront Management Act's construction ban effected a ‘taking’ of his property without just compensation. A state court found that this prohibition rendered Lucas's parcels "valueless" and that Lucas's properties had been "taken" by operation of the Act. The state was ordered to pay "just compensation" in the amount of $ 1,232,387.50. The Takings Clause of the Fifth Amendment is a provision of the Bill of Rights that prevents the government from seizing private property without just compensation. In its original form, the SC Coastal Zone Management Act of 1972 required owners of coastal zone land in a "critical area" (defined in the legislation to include beaches and immediately adjacent sand dunes), to obtain a permit from the newly created South Carolina Coastal Council prior to committing the land to a "use other than the use the critical area was devoted to on September 28, 1977." The regulation that the state first tried to enforce was for the greater good, but this collided with the rights of the individual. Lucas purchased the property in 1986.
What where the benefits of the state’s Beachfront Management Act?
How would you quantify them? Should Lucas have been compensated?

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