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Ecological and Economical Importance of Biodiversity

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Abstract

Here the importance of environment in economics are observed. Environmental economics can help to understand some important and controversial issues of environment. It focuses on the monetary value of ecosystems and the costs and benefits of environmental policies.

Keywords: Environment; Evaluation; Economics; Ecology; Pollution.

1. Introduction

Economics is the study of the allocation of scarce resources, including how markets function and how incentives affect people's, businesses' and institutions' behavior. Within this discipline, environmental and natural resource economics is the application of the principles of economics to the study of how environmental and natural resources are developed and managed. . Environmental economics is the study of the economics of ecological and environmental issues.

Environmental economics is an area of economics dealing with the relationship between the economy and the environment. Environmental economists study the economics of natural resources from both sides - their extraction and use, and the waste products returned to the environment. They also study how economic incentives hurt or help the environment, and how they can be used to create sustainable policies and environmental solutions.

Environmental economics is a sub-field of economics that is concerned with environmental issues. It has become a widely studied topic due to growing concerns in regards to the environment in the twenty-first century.

Environmental economics, sub discipline of economics that applies the values and tools of mainstream macroeconomics and microeconomics to allocate environmental resources more efficiently.

Environmental economics is interdisciplinary in nature, and, thus, its scope is far-reaching. The field, however, remains rooted in sound economic principles. Environmental economists research a wide array of topics, including those related to energy, biodiversity, invasive species, and climate change.

2. Discussions

Environmental goods are aspects of the natural environment that hold value for individuals in society. Just as consumers value a jar of peanut butter or a can of soup, consumers of environmental goods value clean air, clean water, healthy ecosystems, and even peace and quiet. Such goods are valuable to most people, but there is not usually a market through which one can acquire more of an environmental good. That absence makes it difficult to determine the value that environmental goods hold for society. For example, the market price of a jar of peanut butter or a can of soup signals the value each item holds for consumers, but there are no prices attached to environmental goods that can provide similar signals.

To some it may seem unethical to try to place a dollar value on the natural environment. However, there are plenty of cases in which ethics demands such a valuation. Indeed, in cases of extreme environmental damage, as resulted from the Exxon Valdez oil spill in Alaska in 1989, an unwillingness to apply a value to that environmental loss could be considered equivalent to stating that clean Alaskan waters have no value to anyone. The assessment of appropriate damages, fines, or both in such cases often depends on the careful valuation of aspects of the environment. In the case of environmental policy development, uncertainty about the benefit that environmental goods provide to society could easily skew the results of a cost-benefit analysis (a comparison made between the social benefits of a proposed project in monetary terms and the project's costs) against environmental protection. That would, in effect, undervalue environmental goods and could possibly lead policy makers to believe that certain environmental regulations are not worth the costs they impose on society when, in fact, they are.

2.1. Valuing the Environment

Economists have long tried to accurately determine the value of environmental goods to society. That effort has led to several valuation techniques.

2.2. Contingent Valuation

Contingent valuation, or stated preferences, is a seemingly simple method that involves asking people directly about their values for a particular environmental good. This method is particularly useful in determining the value of environmental goods that individuals have yet to experience or may never actually experience themselves.

Contingent valuation was useful in the Exxon Valdez oil spill. This method was used to determine, among other things, the value placed on simply knowing that a pristine Alaskan wilderness exists (the existence value), even though many respondents might never actually experience that wilderness. More generally, the contingent-valuation method is often used in policy development to determine how much respondents would be willing to pay for a higher-quality environment.

2.3. Sources of Bias

However, despite its simple concept, the contingent-valuation method carries with it a host of complex problems that must be taken into account for the results of a survey to be considered credible. The problems usually stem from one or more of the following: information bias (where the respondent has no information), hypothetical bias (where the respondent will neither pay nor give a reasonable answer), starting-point bias (where the respondent is influenced by the initial numbers given as examples or as part of a range in survey), and strategic bias (where the respondent wants a specific outcome). Because any bias can hinder the usefulness of a contingent valuation survey, special care must be taken to ensure that bias is minimized.

With information bias, hypothetical bias, and starting-point bias, respondents unintentionally misrepresent the value that they hold for an environmental good. With information bias, respondents lack enough information to form an accurate response. To avoid that type of bias, surveyors will usually provide a great deal of information to respondents about the survey topic.

Hypothetical bias occurs because individuals tend to respond differently to hypothetical scenarios than they do to the same scenarios in the real world. One solution to that problem is to conduct the contingent-valuation surveys in a laboratory setting. The surveyor can then remind respondents to consider the financial ramifications that their responses would produce in a real-world setting. The surveyor can also use experimental techniques that mimic real-world conditions.

Starting-point bias results when respondents are influenced by the set of available responses to the survey. Solving that problem requires significant pretesting of a survey’s design.

Unlike the other types of response bias mentioned above, strategic bias occurs when respondents intentionally try to manipulate the outcome of a survey. It is not always possible to eliminate intentionally biased responses. However, it is generally best to randomly survey a large number of individuals, because that will decrease the likelihood that strategic bias will undermine the results.

2.4. Contingent-Valuation Applications

Contingent-valuation methods have been used to determine the amount respondents would be willing to pay for many environmental goods. For example, respondents have been asked the value they would place on increased air visibility in the White Mountains and the Grand Canyon in the United States. Contingent-valuation methods also have been used to determine the value of old-growth forest preservation in the face of industrial expansion.

3. Environmental Economist Education Requirements

Some government positions are available to workers with bachelor's degrees. However, most positions required advanced degrees. The majority of environmental and other economists have doctoral degrees. Graduates must have a strong background in math and statistics. Positions in business often require relevant work experience in addition to a graduate degree. Seek out internships to gain practical experience in economic analysis.

4. Ecological Services and Functions of Biodiversity

The principal biodiversity goods and functions can be summarized as follows:

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a) Regulation of global processes: atmospheric flow of gases that affect global and local climates and the breathing air;

b) Conservation of soil and water: maintenance of the hydrologic cycle and erosion control;

c) Cycling of nutrients and energy: photosynthesis, soil renewal, nitrogen fixation, organic matter decomposition, etc.;

d) Saving of genetic information: that warrants the permanence of life on earth;

e) Maintenance of plant reproduction through pollination and seed dispersal;

f) Provision of raw material for sustaining human activities: agriculture, medicine, manufacturing, industry, etc.; and

g) Provision of recreation opportunities

5. Ecological Measurement of Biodiversity

From the above discussion, it can be appreciated that the primary interest in measuring biodiversity is that biodiversity level is an indicator of well-being of ecological systems, which also dictate the productivity to humankind of those systems.

Biodiversity has two dimensions: richness (variety) and abundance (number). Ecologists typically utilise three types of biodiversity measure:

a) Species richness indices – a measure of the number of species in a defined sampling unit.

b) Species abundance indices – compares the level of evenness amongst numbers of each species versus unevenness (unequal). Usually some species are abundant whereas most are not i.e. a few species dominate.

c) Proportional abundance indices – which seek to summarize richness and evenness into a single figure e.g. Shannon and Simpson indices.

6. Ecological and Economic Importance of Biodiversity

As stated earlier, biodiversity is manifested in the form of biological resources. However, the presence of biological resources is only the end result of a set of interrelated ecosystem processes, or functions:

a) Water cycle. The status of a water cycle in any given environment ranges from 'ineffective' to 'effective'. An effective water cycle is one that retains and makes available to the system the greatest percentage of rainfall received. One characteristic tends to be higher and longer duration river/stream flows. High levels of plant cover (whether grasses or otherwise) are usually required to facilitate an effective water cycle, which in turn results in higher ecosystem productivity; together with higher biodiversity levels.

b) Mineral cycle. Productive systems are dependent on a varied and available supply of minerals for regeneration. Greater biomass levels contribute healthy mineral supplies, which in turn result in higher ecosystem productivity and higher biodiversity levels.

c) Energy flow. Energy flow is a measure of the productivity of the system, and is determined by the system's ability to convert sunlight into plant production through photosynthesis, which in turn is dependent on plant cover.

d) The three processes act in tandem, and therefore constitute a set of processes. This set can move in three directions: 'spiraling up', resulting in greater ecosystem productivity and manifested by greater biodiversity; 'spiraling down', manifested by decreased productivity and biodiversity; and 'neutral'.

7. Natural Resources as Scarce Resources

Natural resources, often termed as "the free gifts of nature", are neither free nor finite. Therefore, welfare of a society depends on how it allocates its scarce natural resources among the competing needs by making choices. Economics as study of choice can contribute to natural resource and environmental management by:

a) Identifying circumstances which generate natural resource problems

b) Determining the causes of these problems

c) Identifying possible solution and comparing their cost and benefits

In making the choices, tradeoffs have to be made, that is giving up one thing in order to get something else. Economists have three main areas where trade-offs are made: what is produced with the available (natural) resources such as land, how much is produced (food crops or forest products) and for whom goods and services are produce (who will enjoy the food crops and the forest products produced from the land resource).

8. Fundamental Issues in the Economic Approach to Resource and Environmental Issues

Property rights, efficiency and government intervention

We have already stated that a central question in resource and environmental economics concerns allocative efficiency. The role of markets and prices is central to the analysis of this question. As we have noted, a central idea in modern economics is that, given the necessary conditions, markets will bring about efficiency in allocation. Well-defined and enforceable private property rights are one of the necessary conditions. Because property rights do not exist, or are not clearly defined, for many environmental resources, markets fail to allocate those resources efficiently. In such circumstances, price signals fail to reflect true social costs and benefits, and a prima facie case exists for government policy intervention to seek efficiency gains. Deciding where a case for intervention exists, and what form it should take, is central in all of resource and environmental economics, as we shall see throughout the rest of this book. The foundations for the economic approach to policy analysis are set out and the approach is applied in the subsequent chapters. Some environmental problems cross the boundaries of nation states and are properly treated as global problems. In such cases there is no global government with the authority to act on the problem in the same way as the government of a nation state might be expected to deal with a problem within its borders.

The role, and the limits, of valuation, in achieving efficiency

As just observed, many environmental resources – or the services yielded by those resources – do not have well-defined property rights. Clean air is one example of such a resource. Such resources are used, but without being traded through markets, and so will not have market prices. A special case of this general situation is external effects, or externalities. As shown in Chapter 5, an externality exists where a consumption or production activity has unintended effects on others for which no compensation is paid. Here, the external effect is an untraded – and unpriced – product arising because the victim has no property rights that can be exploited to obtain compensation for the external effect. Sulphur emissions from a coal-burning power station might be an example of this kind of effect. An introduction to natural resource and environmental economics 11 However, the absence of a price for a resource or an external effect does not mean that it has no value. Clearly, if well-being is affected, there is a value that is either positive or negative depending on whether well-being is increased or decreased. In order to make allocative efficient decisions, these values need to be estimated in some way. Returning to the power station example, government might wish to impose a tax on Sulphur emissions so that the polluters pay for their environmental damage and, hence, reduce the amount of it to the level that goes with allocative efficiency. But this cannot be done unless the proper value can be put on the otherwise unpriced emissions. There are various ways of doing this – collectively called valuation techniques – which will be explored at some length .Such techniques are somewhat controversial. There is disagreement between economists over the extent to which the techniques can be expected to produce accurate valuations for unpriced environmental services. Many no economists with an interest in how social decisions that affect the environment are made raise rather more fundamental problems about the techniques and their use. Their objection is not, or at least not just, that the techniques may provide the wrong valuations. Rather, they claim that making decisions about environmental services on the basis of monetary valuations of those services is simply the wrong way for society to make such decisions.

The time dimension of economic decisions

Natural resource stocks can be classified in various ways. A useful first cut is to distinguish between ‘stock’ and ‘flow’ resources. Whereas stock resources, plant and animal populations and mineral deposits, have the characteristic that today’s use has implications for tomorrow’s availability, this is not the case with flow resources. Examples of flow resource are solar radiation, and the power of the wind, of tides and of flowing water. Using more solar radiation today does not itself have any implications for the availability of solar radiation tomorrow. In the case of stock resources, the level of use today does have implications for availability tomorrow. Within the stock resources category there is an important distinction between ‘renewable’ and ‘nonrenewable’ resources. Renewable resources are biotic, plant and animal populations, and have the capacity to grow in size over time, through biological reproduction. Non-renewable resources are abiotic, stocks of minerals, and do not have that capacity to grow over time. What are here called non-renewable resources are sometimes referred to as ‘exhaustible’, or ‘delectable’, resources. This is because there is no positive constant rate of use that can be sustained indefinitely – eventually the resource stock must be exhausted. This is not actually a useful terminology. Renewable resources are exhaustible if harvested for too long at a rate exceeding their regeneration capacities. From an economic perspective, stock resources

Are assets yielding flows of environmental services over time? In considering the efficiency and optimality of their use, we must take account not only of use at a point in time but also of the pattern of use over time. Efficiency and optimality have, that is, an intertemporal, or dynamic, dimension, as well as an infratemporal, or static, dimension. In thinking about the intertemporal dimension of

8. Pollution Control

The path of development has been prepared, followed and harvested by western nations. They had done large scale exploitation of resources found along the path. These countries of rich club, being first to taste so called development, reacted aloof towards the catastrophes like global warming, climate change and; degradation and loss of biodiversity, irreplaceable loss of earth plasma (resources). Developed economies like United States of America, Japan, and United Kingdom have major share in generating pollution. Out of altruism they do not want developing nations to commit the same mistakes and exaggerate the pollution. Hence they had prepared policy and framework for emerging economies like China, India, and Brazil to bear the cost of pollution reduction and blindly believe their good consensus. But developing nations took a stand of negotiations, instead of affirmation. They have denied the adoption of emission taxation or trading pacts if developed nations (especially USA) did not actively involve themselves. They had the point that both developed and developing nations have not contributed the emissions in same proportions in past. And, being developing nations it is obvious to have an increase in pollution levels. Hence, developing nations are not liable to pay the same amount of fines or taxes as the developed nations. Being second on the way of development, developing economies have asked the western nations for technologies transfer to control the global pollution. According to recent statement of Indian environment minister Jayantha Natarajan that transfer of technology is the most important issue, which has not yet happened (The Hindu, 2011). Economics run on the twin themes of scarcity and efficiency (Samuelson and Nordhaus). Those will decide what to produce and in what quantity; how to produce and; for whom to produce. In past, we partly answered these questions before exploiting natural resources to fulfil social needs and demands. Chiroleu-Assouline & Fodha, the consumption 8 activity of present generations causes emissions of pollutants which degrade the environmental quality, harming the welfare of all future generations. Hence, need to figure out how to organize society in a way which produces the most efficient use of resources. From scarcity or efficiency anyone aspect being neglected will lead to pollution. Developing and developed both economies should acknowledge the reality of resource scarcity and pollution abundant. That is where economics makes its unique contribution.

9. Conclusion

Here thus we have discussed about some characteristics of environment. We discussed some important issues. The evaluation of environment by economics are here mostly gotten priority. The economic terms are also explained. Many natural resources are also discussed.

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