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Volume 8 of

# Man and the Environment

Information Guide Series

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# Environmental Economics

A GUIDE TO INFORMATION SOURCES

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*Volume 8 in the Man and the Environment Information Guide Series*

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## VITAE

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## **Part 1**

# **CONCEPTUAL FOUNDATIONS**





## Chapter 1

### INTRODUCTORY READINGS

Although environmental economics is a new discipline, it has developed rapidly in recent years. Much of the current literature being produced is concerned with extending the analysis of specific issues within the subject or with developing more sophisticated empirical studies. A newcomer could easily get the impression that environmental economics is an arcane subject in which people spend all their time arguing about esoteric fine points. This being the case, there is a need to be able to find papers which cover the subject in a more general, common-sense fashion in order that its major outlines may be discovered before one becomes bogged down in the specifics.

In this first brief chapter we have collected a group of papers which we hope will fulfill this task. All of them deal with the basic issues and approaches of environmental economics without using the elaborate tools of economic analysis. We hope that by reading some of these papers a user will be able to find out what environmental economics is and how it approaches the basic problem of environmental quality management.

Baumol, William J. "Environmental Protection at Minimum Cost." AMER.J. ECON.SOC. 30 (October 1971): 337-44.

A nontechnical discussion of the pros and cons of different types of public policy for achieving greater pollution control.

Chase, Richard X. "Economic Analysis and Environmental Quality." AMER.J. ECON.SOC. 31 (July 1972): 271-82.

An essay which attempts to establish economic analysis as a useful analytic approach for dealing with environmental quality.

Commoner, Barry. THE CLOSING CIRCLE; NATURE, MAN AND TECHNOLOGY. New York: Alfred A. Knopf, 1971. 326 p.

A popular account of recent environmental problems, their causes and cures which lays particular emphasis on the idea that prevailing social choice processes have led to the adoption of polluting tech-

## Introductory Readings

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nology rather than "clean" techniques. It presents separate chapters on problems of Los Angeles smog, Lake Erie, nitrogen pollution in Illinois as well as many other case examples.

Fisher, Anthony C. "Population and Environmental Quality." PUBLIC POLICY 19 (Winter 1971): 19-35.

Argues that reduced environmental quality is not primarily related to population growth, but rather to "a pervasive price distortion." Therefore public policy remedies should strive to correct these price distortions rather than population control.

Freeman, A. Myrick III, and Haveman, Robert H. "Residuals Charges for Pollution Control: A Policy Evaluation." SCIENCE 177 (28 July 1972): 322-29.

Discusses the general policy problem of environmental quality management, that of getting residuals dischargers to take into account the environmental damage they inflict on others. The approach of residuals charges is contrasted with the policy approach most frequently taken in this country: legal regulation and enforcement.

Jarrett, Henry, ed. ENVIRONMENTAL QUALITY. Baltimore: Johns Hopkins Press for Resources for the Future, 1966. 163 p.

Kneese, Allen V. "Environmental Pollution: Economics and Policy." AMER. ECON.REV. 61 (May 1971): 153-66.

A general discussion of recent developments in environmental economics. A review of several applied studies and discussion of current environmental policies.

\_\_\_\_\_. "Management Science, Economics, and Environmental Science." MANAGEMENT SCI. 19 (June 1973): 1122-37.

An essay drawing parallels between microeconomics and management science, and suggesting how management science models can be expanded to examine environmental policy, management, and institutions.

\_\_\_\_\_. "Natural Resources Policy 1975-1985." J.ENV.ECON.MAN. 3 (December 1976): 253-88.

This is a review of current natural resources policy in the United States by a leading member of the profession. He concludes that the present status of policy is cause for deep concern, being "inconsistent, often outdated, and grossly overdependent on direct regulation vis-a-vis adjustments in the defective system of economic incentives." Many suggestions covered are those given for improvements in natural resources and environmental policy.

\_\_\_\_\_. "Strategies for Environmental Management." PUBLIC POLICY 19 (Winter 1971): 37-52.

A nontechnical review of alternative approaches to pollution management.

Krutilla, John V. "Conservation Reconsidered." AMER.ECON.REV. 57 (September 1967): 777-86.

A wide-ranging essay on economic notions of conservation, measures of resource scarcity, and tastes and technology.

Parish, R.M. "Economic Aspects of Pollution Control." AUSTRALIAN ECON. PAP. 11 (June 1972): 32-43.

Ruff, Larry E. "The Economic Common Sense of Pollution." PUBLIC INTEREST 19 (Spring 1970): 69-85.

A nontechnical discussion of the economic control of pollution stressing the use of effluent charges to manage environmental quality.

Russell, Clifford S., and Kneese, Allen V. "Establishing the Scientific, Technical and Economic Basis for Coastal Zone Management." COASTAL ZONE MANAGEMENT J. 1 (Fall 1973): 47-64.

Although directed at the coastal environment, this paper presents many of the leading concepts of environmental economics in non-technical language.

Solow, Robert M. "The Economist's Approach to Pollution and Its Control." SCIENCE 173 (6 August 1971): 498-503.

An essay designed to place the problem of pollution into an economic framework. The simple concept is advanced that excess pollution arises because the waste disposal capacity of the environment is offered free of charge.



## Chapter 2

### THEORETICAL FOUNDATIONS

Environmental concern is centuries old, dating back at least to 1285 A.D. when the burning of soft coal in London caused problems of air pollution. However, the first systematic economic analysis of pollution as an externality problem was advanced by Pigou in this century. He saw a distinction between private and social cost, and reasoned that if the production of a firm or individual were to create a spillover, or externality, which directly affected other economic units, then the marginal social cost and the marginal private cost of production would diverge. This divergence would then lead the firm or individual to produce too much if the spillover is undesirable and too little if the externality is desirable. The suggestion, then, would be to apply a tax (subsidy) equal to the difference between marginal social and private costs so that firms would be induced to produce the socially efficient output--where price equals marginal social cost.

Section 2.1 lists some of the important theoretical works on externalities, including Pigou's. Many of these are "classics," including Bator, who shows how externalities can disrupt the ability of markets to function properly; Buchanan and Stubblebine, who suggest why some externalities are clear candidates for public action while others are not; and Scitovsky, who stresses differences in external economies arising from the market as compared with those arising from technological interactions. A more recent contribution by Starrett argues that the usual definition of an externality is too broad and, in fact, defines all goods in a barter economy. He chooses to think of externalities as synonymous with nonexistence of markets and defines an externality to occur whenever the private economy does not have sufficient incentives to create a potential market. Finally, Mishan reviews the existing externalities doctrine with special reference to applicability to environmental economics. He gives special attention to the relation of externalities to public goods.

Several key references on public goods are suggested in section 2.2. Samuelson offers the classical distinction of a public good as one for which "each individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good. . . ." Ellickson generalizes this notion to consider the possibilities of exclusion or congestion; Head and Shoup, and Weisbrod see things in a less polarizing context than Samuelson's distinction.

As Head and Shoup show graphically, some goods may be neither unambiguously public nor private.

Coase began what has become the subject of continuing controversy in the theory of externalities by suggesting weaknesses in the Pigovian notion of corrective taxes. In his classic article he shows (1) that the same allocative result would be obtained by bribing the generator of an external diseconomy to reduce production, and (2) the solution of the problem is best left to negotiation among the affected parties with no government intervention required. The literature included in section 2.3 is either critical or supportive of the Coase conclusion--essentially striving to answer whether or not the Coase theorem can realistically be applied to pollution control problems in a typical situation involving large numbers of affected parties. Many other papers on this topic have been surveyed by Dick.

### 2.1 EXTERNAL EFFECTS

Bator, Francis. "The Anatomy of Market Failure." *QUART.J.ECON.* 72 (August 1958): 351-79.

A theoretical discussion of the manner in which externalities may disrupt the normal ability of markets to achieve efficient resource use throughout an economy.

Bohm, Peter. *EXTERNAL ECONOMIES IN PRODUCTION*. Stockholm: Almqvist and Wikells, 1964. 95 p.

Buchanan, James M. "External Diseconomies, Corrective Taxes, and Market Structure." *AMER.ECON.REV.* 59 (March 1969): 174-77.

Criticizes the Pigouvian tax-subsidy tradition, concluding that even if we disregard all measurement problems, making the marginal private cost as faced by the decision-making unit equal to marginal social cost, it does not offer an "Aladdin's lamp" for the applied welfare theorist.

\_\_\_\_\_. "Politics, Policy and the Pigouvian Margins." *ECONOMICA* 29 (February 1962): 17-28.

An essay which attempts to demonstrate that, with consistent assumptions about human behavior in market and political institutions, any attempt to alter an existing market situation characterized by serious externalities will yield solutions which embody different, but analogous, externalities to those presently existing.

Buchanan, James M., and Stubblebine, William C. "Externality." *ECONOMICA* 29 (November 1962): 371-84.

A major paper in externality economics which established concepts for later papers. Of primary importance is the notion that some externalities may be relevant for public policy action and others not.

Burrows, Paul. "On External Costs and the Visible Arm of the Law." OXFORD ECONOMIC PAPERS 22 (March 1970): 36-56.

Considers the two functions of the law in the treatment of external costs--namely, settling disputes over legal rights and providing compensation arrangements to the market and tax-subsidy schemes.

d'Arge, Ralph C., and Wilen, James E. "Government Control of Externalities, or the Prey Eats the Predator." J.ECON.ISSUES 8 (June 1974): 353-72.

The authors suggest implications of alternative policies for the resolution of nonmarket exchange problems. This article provides a detailed treatment of traditional positions by way of a taxonomic examination of assumptions and policy recommendations.

Davis, Otto A., and Whinston, Andrew. "Externalities, Welfare and the Theory of Games." J.POLIT.ECON. 70 (June 1962): 241-62.

An examination of conditions when standard taxes will work in correcting externalities, and situations when they will not work. Particular attention is paid to the way externalities enter the cost functions of affected firms, and how individual firms adjust to the actions of one another.

\_\_\_\_\_. "On the Distinction between Public and Private Goods." AMER. ECON.REV. 57 (May 1967): 360-73.

Analyzes the problem of institutional choice (private market or public agency) for providing goods with different characteristics. Second-best considerations are used to examine particularly the extent to which public agencies would allocate "public goods" (in the technical sense) better than markets.

Dolbear, F. Trenery, Jr. "On the Theory of Optimum Externality." AMER. ECON.REV. 57 (March 1967): 90-103.

A theoretical paper analyzing the interactions of two consumers, one who lives on bread and heat (the latter of which produces smoke) and one who lives on bread alone. Simple diagrammatic methods are used to show that the initial distribution of rights to clean air will affect the final result in terms of air quality because of income effects. It is also shown that some of the schemes for using taxes to control pollution will not generate Pareto-optimal results.

## Theoretical Foundations

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Evans, Alan W. "Private Goods, Externality, Public Good." SCOTTISH J. POLIT.ECON. 17 (February 1970): 79-89.

Holterman, S.E. "Externalities and Public Goods." ECONOMICA 39 (February 1972): 78-87.

Attempts to show the precise relationship between externalities and public goods.

Lin, Steven A.Y., ed. THEORY AND MEASUREMENT OF ECONOMIC EXTERNALITIES. New York: Harcourt Brace Jovanovich, Academic Press, 1976. 265 p.

The volume results from a conference on externalities held at Southern Illinois University in April 1974. Contributions are aggregated into four parts: the nature of externalities, the nature of externalities in collective and decentralized decision making, externalities in general equilibrium, and measurements of externalities. Also included are several empirical chapters on airport noise, local tax problems, and wilderness congestion.

Meyer, Robert A., Jr. "Externalities as Commodities." AMER.ECON.REV. 61 (September 1971): 736-40.

Develops a general equilibrium model with externalities treated as additional commodities via "technologies."

Mishan, Ezra, J. "The Postwar Literature on Externalities: An Interpretive Essay." J.ECON.LIT. 9 (March 1971): 1-28.

A review of externalities doctrine with special attention given to their relation to public goods and their application to environmental economics.

\_\_\_\_\_. "Reflections on Recent Developments in the Concept of External Effects." CANADIAN JOURNAL OF ECONOMICS AND POLITICAL SCIENCE 31 (February 1965): 3-34.

Provides a summary and critique of the recent literature on external effects, including Scitovsky's, Meade's, Davis and Winston's, Buchanan and Stubblebine's works, and many others.

\_\_\_\_\_. "Welfare Criteria for External Effects." AMER.ECON.REV. 51 (September 1961): 594-613.

Mohring, Herbert, and Boyd, J. Hayden. "Analyzing 'Externalities': 'Direct Interaction' vs. 'Asset Utilization' Frameworks." ECONOMICA 38 (November 1971): 347-61.



An attempt to contrast two different ways of looking at externalities; direct interaction where one person's activity has a direct affect on another's and asset utilization, referring to the situation where several people are trying to use the same natural resource. It concludes that the latter perspective is more useful.

Scitovsky, Tibor. "Two Concepts of External Economics." J.POLIT.ECON. 62 (April 1954): 143-51.

A seminal paper on the concept of economic externality, stressing particularly the differences between interdependencies arising from the market system and interdependencies arising from technological interactions.

Starrett, David. "Fundamental Non-Convexities in the Theory of Externalities." J.ECON.THEORY 4 (April 1972): 180-99.

Shows that under the usual convexity assumptions there is considerable economic rent and that for a large class of externality problems this result breaks down because of logical nonconvexities in production sets.

Turvey, Ralph. "On Divergences Between Social Cost and Private Cost." ECONOMICA 30 (August 1963): 309-13.

A brief but effective attempt to review and synthesize a number of recent contributions to the economic theory of externalities using very simple analytical tools.

Walter, G.R. "Intertemporally Optimal Urban Pollution." PAPERS OF THE REGIONAL SCIENCE ASSOCIATION 28 (1972): 237-54.

Uses an optimal control model to examine urban pollution, which the author characterizes as essentially a congestion problem. The author determines optimal time paths of urban consumption, labor force, and pollution. Walter considers the problems of urban regulation, arguing that the strongest case can be made for placing taxes on industrial effluents, though this will not be workable for controlling pollution from the activities of many consumers.

Wellisz, Stanislaw. "On External Diseconomies and the Government-Assisted Invisible Hand." ECONOMICA 31 (November 1964): 345-62.

A critique of the Coasian proposition, whereby external diseconomies will be optimally adjusted by private bargaining. Wellisz takes the position that private bargaining procedures are limited in their ability to achieve optimum externality adjustments.