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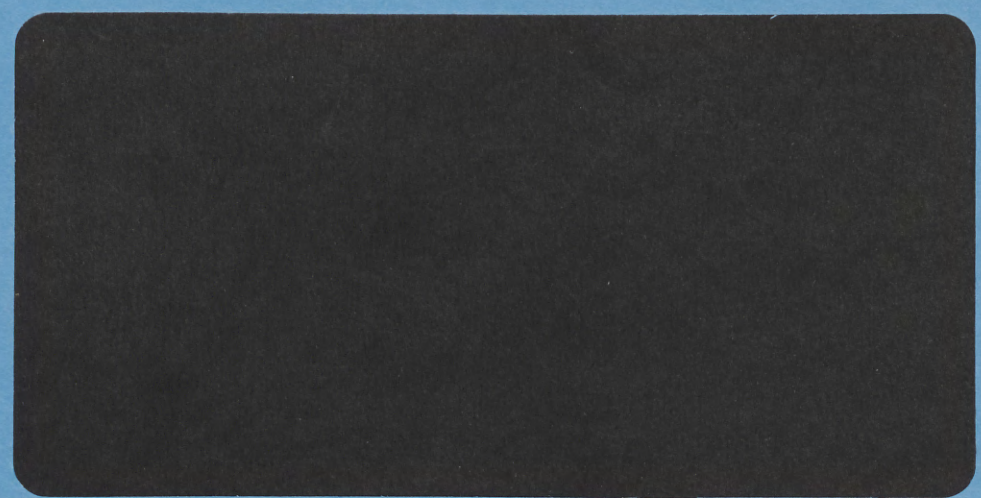
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Environment
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1980

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ECOLOGY AND ECONOMICS:
DIFFERENCES IN PHILOSOPHY*

by

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Staff Paper 162

August 1980

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*Paper presented on July 30, 1980, at the American
Agricultural Economics Association Annual meetings,
University of Illinois, Urbana, Illinois.

Abstract

Ecology has been referred to as the "subversive science," as man is argued part of the environment, having only limited control. Economics is based on MAN as a socio-cultural being, as opposed to man the animal. Recognition of differences in philosophy must be explicit before real communication can begin.

ECOLOGY AND ECONOMICS:
DIFFERENCES IN PHILOSOPHY?

Gary D. Lynne and Roy R. Carriker*

Casual empiricism and formal studies have produced identical conclusions: concern for the environment has become real in the United States (RFF). Environmental groups have achieved prominence in recent years. College libraries have become stocked with books on ecology, a subject referred to by some as the "subversive science" (Shepard and McKinley). Ecology and ecologists have emerged from obscurity into popularity over a relatively short period of time.

Economists have also been involved in the dialogue relating to environmental issues. Boulding on "spaceship earth," Barnett and Morris on resource scarcity, and publications by Smith and Krutilla are representative of this involvement. These economists, and others like them, have addressed problems of environmental quality in the context of economic growth. Some have questioned the validity of Gross National Product as a measure of social progress (See eg., Smith, p. 289).

There is evidence that ecologists and economists have generally agreed that serious problems exist as regards the quality of the environment. Unfortunately, however, ecologists and economists often find themselves at odds, notwithstanding their shared concern over matters pertaining to environmental quality. The resulting debates are characterized, not so much by disagreement over substantive issues, but by a maddening inability to communicate.

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It is the overall purpose of this paper to examine the debate between the ecologist and the economist. The vehicle for discussion will be a published exchange of viewpoints concerning a proper basis for defining and measuring the value of coastal wetlands (Walker, Odum and Skjei, Odum, Shabman and Batie). The applicability of the analysis extends, however, across the field of environmental economics.

This paper identifies a basic philosophical difference between economists and ecologists in their approach to environmental issues. To aid progress toward better communication between the two groups an "intermediate philosophy" is suggested which may serve as a basis for articulating commonality of purpose and identifying roots of misunderstanding.

Ecologists vs. Economists on the Nature of Valuation

A primary topic of debate between ecologists and economists revolves around the nature of "value," as exemplified in the concern over the value of marshes (Gosselink, Odum, and Pope (GOP); Shabman and Batie; Odum). In the perception of the ecologist, marsh systems have a high "natural value," which, if translated into monetary terms is very high (if not infinite). The economist defines economic value in a characteristic manner, and presents evidence that marsh values are not only certainly finite, but probably fairly low. More importantly, each is critical of the basis for valuation used by the other.

To the economist, economic value arises from the perceptions of people regarding the utility received from a mixture of goods and services bargained for in the market place. Demands are revealed through the market mechanism and market clearing prices are formulated which reconcile those demands with available supplies.

Economists argue that the concept of economic demand applies to all resources, goods, or services, even in those cases where no current market exists. The literature on option demand, for example, recognizes the relevance of economic demand as it applies to such services as the "waste assimilative capacity of environment," and the "essence of our life support system."

Economists have learned to define environmental problems in terms of the failure of markets to allocate scarce environmental resources in accordance with man's preferences for natural services and amenities. A literature has been amassed on the problems involved in the exploitation of a common property resource by individuals acting on the basis of private, rather than social, maximization of net benefits. Additional literature examines the role of alternative institutional arrangements for ameliorating the causes, or the consequences, of market failure.

Ecology, traditionally, is a branch of science concerned with the interrelationship of organisms and their environments. The focus of debate between ecologists and economists on the definition of value and its application to environmental policy has been especially acute in the case of wetlands. Wetlands preservation has recently become a favored cause of conservationists. Protection of wetlands is justified primarily on grounds of their beneficial biological and hydrological effects; so, it is to the physical and biological sciences that government and the public have turned for guidance in the formulation of management policies.

The impetus for value estimates stems from the fact that wetlands are endangered by dredge-and-fill activities associated with residential and recreational developments which value wetlands for their proximity to

open water, rather than for their role as a part of natural systems. Interest in obtaining monetary valuations of natural services of wetlands stems from a desire to clearly identify benefits of wetlands preservation, and to facilitate comparisons with the benefits of wetlands development.

Using a methodology developed by H.T. Odum, a "life-support value" of an acre of marshland was calculated by GOP at nearly \$82,000. This monetary value of the "work of nature" was determined by multiplying calories of energy resulting from primary production of an acre of representative marsh by a dollar value per calorie. The dollar value per calorie was obtained by dividing the gross national product by the national energy consumption index to calculate an average amount of energy consumed per dollar of output in the United States.

This connection between energy units and monetary units is justified, argue the proponents, because, "Money can go around only in energy flows through the system to support the work that money buys" (Odum and Odum), and that, "ultimately prices are determined by energy" (Odum and Odum).

This significant paper has been roundly criticized by economists (Shabman and Batie, Huetner). Shabman and Batie argue that the "total life-support methodology" represents an illegitimate marriage of the principles of systems ecology with economic theory, and that it ignores the nature of the process by which economic values are determined. They note that the life-support methodology produces inflated values, indicating that even proponents of the methodology recognize the difficulty, as indicated by the following quote from Odum and Odum:

This value for an acre of forest may be regarded as somewhat inflated by egocentric man, since he might not consider all work done by a forest as useful to man. However, we believe it comes closer to the real value than conventional cost-accounting which

values forests only in terms of yield of wood or other consumer products and ignores its life support values.

Shabman and Batie comment that

Although the values do appear "somewhat inflated," it is not certain that this is because "egocentric man" does not recognize the "real value" of resources in "conventional cost accounting" (their emphasis),

adding further

Still, one does not attempt to correct for market-exchange problems in dollar evaluations by refusing to recognize and utilize the essential premise of demonstrated human preferences to arrive at appropriate values (emphasis added).

This exchange demonstrates a lack of communication between economists and those ecologists who advanced a "life-support methodology" for valuation.

This same failure to communicate appears in an exchange between Walder and Odum-Skjei. Odum and Skjei argued that a wholistic (spelled holistic in their article) view of the entire marsh system including the water column, bottom sediments, intertidal mud flats, pelagic, benthic and intertidal plant and animal communities, are all important and integral to the estuarine system. This estuarine system, in turn, is part of the whole life support system of earth. Their discussion speaks of the "scientific basis for valuation," where the science is ecology, but advances a view of the marsh which leaves them unable to concede that the value of the marsh might be anything but large.

Walker responded to this argument by asserting that scientists functioning as ecologists may be mixing their own personal value systems with the science, resulting in a politization of the science. He noted a prevalent tendency among ecologists to regard

ecological significance as being equivalent to social values. That may be a reasonable position, but not a self-evident truth.

Walker added an expression of concern that

the mixing of political values in scientific data may come about within the discipline where the process may be one of individual ideology, organizational involvement, or selecting funding. It may be as subtle as the researcher seeing what he is looking for, or as blatant as the institutional suppression of dissent...

Walker is suggesting economists may remain more objective in the determinations of values.

The fundamental issue in the debate between ecologists and economists is really more basic than failure of ecologists to understand appropriate techniques for measuring value in terms of individual willingness to pay. The issue is as basic as a fundamental difference in philosophy between most ecologists and economists, a difference which influences problem definition and the meaning of "value," as viewed by practitioners within the separate disciplines.

Philosophical Bases for
Valuation of Natural Systems

The lead article of an excellent readings book published at the peak of the recent environmental concern in this country contains the following observations (Shepard, p. 5):

And so is nature pigeon-holed. The sardonic phrase, "the place of nature in man's world," offers, tongue-in-cheek, a clever footing for confronting a world made in man's image and conforming to words. It satirizes the prevailing philosophy of anti-nature and human omniscience. It is possible because of an attitude which--like ecology--has ancient roots, but whose modern form was shaped when Aquinas reconciled Aristotelian Homocentrism with Judeo-Christian dogma.

and also offers the following quote as one which reflects the attitude of

homocentrism (p. 5).

The only reason anything is done on this earth is for people. Did the rivers, winds, animals, rocks, ever consider my wishes? Surely, we do all our acts in an earthly environment, but I have never had a tree, valley, mountain or flower thank me for preserving it.

The attitudes illustrated by these quotes are of concern to ecologists, and they somehow sound similar to premises underlying an economist's definition of value. They are the basis for the expansionary ethos of the Western world (Marx, Kelso), one which must be brought into better perspective

...only recently have historians begun to appreciate the special contribution of Christianity to this quantitative, expansionary ethos. The crux here is the aggressive, man-centered attitude toward the environment fostered by Judeo-Christian thought: everything in nature, living or inorganic, exists to serve man. For only man can hope (by joining God) to transcend nature.

White also observes (p. 346, 347)

Our daily habits of action, for example, are dominated by an implicit faith in perpetual progress which was unknown either to Greco-Roman antiquity or to the Orient. It is rooted in, and is indefensible apart from, a Judeo-Christian teleology.--Man named all the animals, thus establishing his dominion over them. God planned all of this explicitly for man's benefit and rule: no item in the physical creation had any purpose save to serve man's purposes. And, although man's body is made of clay, he is not simply part of nature: he is made in God's image.

Apparently these authors feel that man-centeredness is the cause of environmental problems. Therefore, economic science with its emphasis on human tastes and preferences and the allocation of scarce resources to satisfy competing (human) wants and needs, is regarded with distrust and occasional outright hostility.

This line of reasoning invites an examination of the philosophical

underpinnings for the theory and method of economics. An early work by Zimmermann can serve to clarify. Zimmermann argued that there are two levels of man, namely MAN, the socio-cultural-economic portion (where MAN is taken to represent not only the individual, but also his institutions) versus man, the animal component. This animal component, in turn, is viewed as being a part of the "neutral stuff" of nature (p. 12). Resources, within this context "become" as opposed to being simply "in existence." That is, resources (including the assimilative capacity of the environment) do not exist until MAN forms the appropriate institution, establishes the want or need, and actually proceeds to use the resource (pp. 12-15). It is because MAN has values that resources are definable, and it is because of MAN's perceptions that the allocation of resources acquires meaning.

It is this concept of MAN to which the received doctrines of economics pertain. Boulding, Kelso, Castle and other economists have suggested that the perspective (or lack of perspective) afforded MAN has caused economists to be insufficiently sensitive to the manner in which natural systems actually relate to the aggregate production function (also see Smith and Krutilla, p. 406). While much of the recent literature on market failure might be offered in response to criticism of the economists' treatment of environmental problems, it is apparent that market failure is a concept which has meaning only in the presence of MAN. The very notion of "failure" of the market reflects an underlying philosophy that MAN is the judge of whether or not the market has failed; indeed, markets and market performance are devoid of context without MAN. Animals and plants are supposed not to have values; MAN does.

Shepard has noted that Western society perceives (p. 7)

that nature is a power structure shaped after human political hierarchy, that man has a monopoly of immortal souls and omnipotence will come through technology.

Each American school child is shown that nature can be described in the "ladder" fashion, with man superseded only by angels and God (Shepard, p. 7). No wonder economists unblushingly refer to derived demand values for various factors and resources in a hierarchy of production processes.

On the other hand, valuation within the context of a philosophy that allows the possibility that other creatures have souls certainly implies a different sort of valuation process. That is, if the world is perceived as one wherein all creatures are on the same level, where the "viscious and lowly parasites, pathogens, and predators, the filthy decay and scavenging organisms," are all accorded the same respect as are "domesticated creatures for virtuous human service" (Shepard), a different perspective emerges. In a world where man (but not MAN) exists as co-equal with his terrestrial "cousin" who happens to walk on four legs, or the one which works to bring about the natural decaying process on a fellow creature who has ended his life on this earth, implications for questions of value are significant.

Because their focus is on MAN, economists have probably not been sensitive enough to the complexity of the interrelationships of our ecosystems on spaceship earth. Economic solutions to market failure will not work to "save-the-earth," unless people's preferences, as MAN, are influenced in that direction. Those solutions depend on the assumption that individuals are informed, and that they understand their very basic and fundamental life support systems. It must also be assumed that individuals,

as MAN, really are rational and able to make decisions relating to that system. Unfortunately it may be the case that individuals never have enough information to make totally rational decisions, resorting instead to a constrained satisficing procedure (Simon). In fact, observation suggests that MAN's decisions about his environment are marginalistic and incrementalistic (Simon), constituting a "muddling through" approach at best (Lindblom).

On the other hand, ecologists, with their focus on man, apparently fail to appreciate or to comprehend the real existence of MAN and the intricacies of the socio-economic system which MAN contrives. The ecologists' failure to recognize MAN and the economists' failure to concede man have diminished the ability of each to communicate with the other. As a result, debates such as between Eugene P. Odum on the one hand, and Shabman and Batie on the other, accomplish little.

An Alternative Perspective-
A Workable Compromise

The notion that man exists on the same level as other organisms in the environment is reasonable only with very casual questioning. The logical conclusion is that MAN can do no more than react to his environment, that he cannot use his special skills in reasoning, thinking, and creating to "overcome" the forces of nature. Such a conclusion would be unacceptable to members of the human race who, in fact, do exercise the ability to pronounce this view of man to be lacking.

By the same token, the progress-seeking, ever-changing, egocentric perspective of mankind as MAN also appears to lead us down a path with dangerous possibilities if it fails to recognize the man (versus MAN)

component of existence. An apocalypse is possible (Kelso), and the intervening time available may not be as great as some would like to believe. Yet the models of economics are strongly egocentric as a natural consequence of the implicit philosophy upon which they are predicated.

There is reason, then to reject the primary portions of both philosophies. Although this is an uncomfortable position to adopt, it is apparent that neither philosophy, taken alone, is capable of resolving the current environmental crisis.

Another path is available, however. It begins with the observation that whatever is done by mankind with regard to the preservation, conservation, and management of natural resources is in fact a decision. A decision, in turn, cannot be made without a value system (Simon). Even if man as a species chooses to turn to a "simpler life," such a move is a decision reflecting a value system that pertains to MAN.

Such an observation need not necessarily be inconsistent with an ecologists' perspective, however. Ecologists have recognized the importance of man's basic life support system. If the populous at large is not as sensitive to these complexities as it should be, the "should" in this context also must be regarded as reflecting a value system pertaining to MAN.

An approach, then, which adopts dimensions of both philosophies is one which recognizes that decisions must be made, values must be consulted, and therefore the notion of MAN as a socio-cultural being is important. It also embraces the view of man, the animal, having certain needs with respect to his environment. Institutions must be designed which serve those needs. Ecologists must continue to educate MAN concerning man's interface with nature.

An ecologist notes (Kucera, p. ix)

The environmental crisis deals with people. It is caused by people.---New dialogues and exchange of viewpoints are keys to awareness, to concern, and hopefully, to a reorientation in public attitudes toward the uses of resources. Without a change in our thinking, there can be no real abatement of the environmental problem.

The concepts of MAN and man are equally important. The creature Homo sapiens is both; and this makes him (her) unique. This statement is, necessarily, an opinion, reflecting a philosophy. The debate between economists and ecologists must identify and resolve basic differences in philosophy (or at least be aware of these differences) so that a foundation of commonality and agreement can be laid, upon which progress can be built. The survival of the spaceship earth may depend on it.

REFERENCES

- Barnett, Harold J. and Chandler Morse. Scarcity and Growth: The Economics of Natural Resource Availability. Baltimore, Md.: The Johns Hopkins Press for Resources for the Future, 1963.
- Boulding, Kenneth E. "The Economics of the Coming Spaceship Earth" Environmental Quality in a Growing Economy, ed. Henry Jarrett, pp. 3-14. Baltimore, Md. The Johns Hopkins University Press for Resources for the Future, 1966.
- Castle, Emery N. "The Economics of Agriculture and Agricultural Economics." Amer. J. of Agr. Econ. 59 (December 1977): 824-833.
- Gosselink, James G., Eugene P. Odum, and R.M. Pope. The Value of the Tidal Marsh Publ. LSU-SG-74-03. Baton Rouge, La.: Center for Wetland Resources, La. State University, May 1974.
- Huetner, David A. "Net Energy Analysis: An Economic Assessment." Science 192 (April 9, 1976): 101-104.
- Kelso, M.M. "Natural Resource Economics: The Upsetting Discipline." Amer. J. Agr. Econ. 59 (1977): 814-823.
- Kneese, Allen V. and Charles L. Schultz. Pollution, Prices, and Public Policy. Wash., D.C.: The Brookings Institution, 1975.
- Kucera, Clair L. The Challenge of Ecology. Saint Louis: The C.V. Mosby Co., Second Edition, 1978.
- Lindblom, Charles E. "The Science of Muddling Through." Public Admin. Review. 19 (Spring 1959): 79-88.
- Marx, Leo. "American Institutions and the Ecological Ideal." The Environmental Challenge eds. Willis H. Johnson and William C. Steer. New York: Holt, Rinehart, and Winston, Inc., 1974, pp. 300-316.
- Odum, Eugene P. "Rebuttal of Economic Value of Natural Coastal Wetlands: A Critique." Coast Zone Management J. 5 (1979): 231-237.
- Odum, Eugene and Howard T. Odum. "Natural Areas as Necessary Components of Man's Total Environment." Transactions of the North American Wildlife and Natural Resources Conference (1972): 178-189.
- Odum, Howard T. Environment, Power, and Society. New York: John Wiley and Sons, 1971.
- Odum, William E. and Stephen S. Skjei. "The Issues of Wetlands Preservation and Management: A Second View." Coast Zone Mgmt. J. 1 (1974): 151-163.

- Resources for the Future. Resources. Wash., D.C.: Resources for the Future, 57 (1978) 1-2, 20-21.
- Shabman, Leonard A. and Sandra S. Batie. "Economic Value of Natural Coastal Wetlands: A Critique." Coastal Zone Mgmt. J. 4 (1978): 231-247.
- Shepard, Paul, "Introduction: Ecology and Man-A Viewpoint." The Subversive Science ed. Paul Shepard and Daniel McKinley, Boston: Houghton Mifflin Company, 1969, pp. 1-19.
- Shepard, Paul and Daniel McKinley. The Subversive Science. Boston: Houghton Mifflin Co., 1969.
- Simon, Herbert A. Administrative Behavior. New York: The Free Press, Third Edition, 1976.
- Simon, Herbert A. "Rational Decision Making in Business Organizations" Amer. Econ. Rev. 69 (1979): 493-513.
- Smith, V. Kerry. "Scarcity and Growth Reconsidered." Amer. J. Agr. Econ. 60 (1978): 284-289.
- Smith, V. Kerry and John V. Krutilla. "Resource and Environmental Constraints to Growth." Amer. J. Agr. Econ. 61 (1979): 395-408.
- Walker, Richard A. "Wetlands Preservation and Management: A Rejoinder-Economics, Science and Beyond." Coast. Zone Mgmt. J. 1 (1974): 227-233.
- Walker, Richard A. "Wetlands Preservation and Management on Chesapeake Bay: The Role of Science in Natural Resources Policy." Coast. Zone Mgmt. J. 1 (1973): 75-101.
- White, Lynne, Jr. "The Historical Roots of Our Ecologic Crisis." The Subversive Science. eds. Paul Shepard and Daniel McKinley, Boston: Houghton Mifflin Co., 1969, pp. 341-350.
- Zimmermann, Erich A. World Resources and Industries. New York: Harper, 1951.

