THREE THEORIES FROM ECONOMICS ABOUT THE ENVIRONMENT

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The thesis of this article is that three of the most influential theories contained in today's environmental literature were first formally stated in the work of English economists who lived between the late 18th and early 20th centuries. These theories are: the Malthusian doctrine of population growth and resource scarcity, John Stuart Mill's theory of the steady-state economy, and the neoclassical economic notion of efficient markets as the solution to environmental and resource problems. In this article, I trace the history of these three schools of economic thought in relation to the environment. Each theory has something different to contribute, and together they present a rather comprehensive scheme for solving environmental problems.

The Industrial Revolution and the Rise of Economic Thought

The 18th century and the Industrial Revolution brought widespread change in the existing order, first in England and later on the European continent and in America. The magnitude of this social change was sufficient to raise concerns about the fate of civilization. A liberalized atmosphere of inquiry (Lombroso 1931) soon led scholars to wonder about how humanity in the face of change might best assure its survival and improvement in the quality of life. Political economy consequently arose as a distinct academic discipline to address the questions of resource scarcity, allocation, and societal well-being. The objective of these new economic philosophers was as simple as it was grand: to obtain an improved understanding of the human condition (Heilbroner 1986).

Malthus and the Classical Economists

The first group of economic philosophers to emerge during the Industrial Revolution has been called the classical economists. Their method of study was through the philosophy of natural law (Heilbroner 1986) that is, the discerning by reason of the naturally endowed set of principles that order human life and community (Finnis 1980). An important member of the classical school was Thomas Robert Malthus. The doctrine of Malthus was set forth in his monumental treatise of 1798 titled, An Essay on the Principle of Population as It Affects the Future Improvement of Society.

The common interpretation of Malthusian scarcity is as follows: society has only the ability to increase agricultural production at an arithmetic rate while the number of mouths to be fed increases at a geometric rate. Hence, at some point, population will outstrip food supplies with calamitous results. Malthus’ argument presents the sophisticated concept of economic scarcity and its attendant effects on human well-being (Barnett and Morse 1963). Economic scarcity refers to the decreased availability of resources relative to the effort required to obtain-them.

The example that Malthus used was agricultural production. While he argued that the quantity of arable land was fixed and someday might be completely occupied by farms, Malthus also recognized that land could be made more productive through intensive cultivation. With greater effort, farmers

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could gradually squeeze more produce from that same fixed amount of land but—and herein lies the
rub—at decreasing rates per each additional laborer. Thus each new worker sent to the field produces
incrementally fewer crops or, as later economists would say, with diminishing marginal returns.

Malthus predicted diminishing marginal returns as farmers sought ways to feed the ever-increasing
masses. The economic scarcity would arise from the fact that society would have to sacrifice
increasingly more to obtain less on the margin. Whether measured by the number of field hands and
their hoes, or by the money required to pay for that labor and equipment, the “cost” of extracting
agricultural produce would increase. And, as populations continued to grow and societies were
pressed harder to feed them, there would come a time when these costs would dominate the entire
economy. Per capita economic growth would cease and then plummet as men struggled just to scratch
a living from the earth. War, plagues, famine and other catastrophes would periodically thin human
population and the cycle of diminishing marginal returns to human effort would then recommence.

**John Stuart Mill and the Stationary State**

Following the classicists, came the Utopian socialist philosopher John Stuart Mill. During his life,
Mill produced an impressive volume of written work on a variety of topics dealing with ethics, law,
morals, and economics (August 1975). His most important contribution with respect to economics and
modern environmental thought was contained in *The Principles of Political Economy* (1848).

Like Malthus, Mill foresaw that increases in human population and wealth could not continue in
perpetuity. At some time, a steady—or as he said “stationary”—state would eventually be reached
where both population and consumption were stabilized, but perhaps at some very low level of human
happiness. What was needed in order to improve the human condition, wrote Mill, was a more
immediate stabilization of population, reduction in aggregate consumption, and a more equitable
world-wide distribution of wealth.

In order to achieve the desired steady-state, Mill advocated a voluntary, less consumptive existence.
Thus, Mill did not share Malthus’ pessimism regarding the ability of humanity to avoid disaster.
Furthermore, the stationary economic state by no means implied to Mill a stationary state of human
improvement. There would always be opportunity for elevating mental culture, and for moral and
social progress.

Mill also introduced a concept which would seem strikingly relevant to twentieth century economists
(Barnett and Morse 1963). It was the notion that personal solitude and natural beauty could be
impaired through population growth and industry. So even though a person may not experience
shortages of conventional agricultural produce and minerals, Mill saw that the process of growing
crops and mining minerals could result in a paucity of quality human habitat.

**The Neoclassical Economists**

At the end of the 19th century in Victorian England were the beginnings of the neoclassical school of
economic thought. The unofficial leader of this school was the Cambridge economist Alfred Marshall.
Where the classicists had relied upon the philosophy of natural law to derive their theories, the
neoclassicists employed the engineer’s tools of analytical geometry and differential calculus to develop
abstract models of market economies (Christensen 1991). Neoclassical economics—with its supply and
demand curves, prices and quantities, and market equilibria—would eventually become the economics
of the modern university classroom. All told, it was a sharp methodological departure from the
classical school.
Neoclassical theory emphasized the so-called “efficient” market as the means of maximizing satisfaction among producers and consumers. As these two groups met in the market place, voluntary exchange prices would be established to set production and consumption at optimal equilibrium levels. Furthermore, increasing prices would spur discovery of new technologies and raw materials, and they would encourage efficiency and substitution both in production and consumption. Any departure from the market system, according to the neoclassicists, would result in a less than optimal allocation of resources and, likewise, lower human satisfaction.

Producer’s and consumer’s surpluses provided a means for neoclassical economists to begin valuing societal welfare, but the conceptual framework was incomplete. It still lacked some means of accounting for pollution and the like which, although they occur external to the market transaction, nevertheless still affect human welfare. The missing piece was supplied by A. C. Pigou, a former student of Marshall, in his 1920 book titled The Economics of Welfare. Pigou also realized that these market-external changes in human welfare could cut both ways yielding beneficial and detrimental effects. These effects he called “uncompensated services and disservices” (Pigou 1932). Pigou (1932) provided an example of an uncompensated service:

“It is true in like manner of land devoted to afforestation, since the beneficial effect on climate extends beyond the borders of the estates owned by the persons responsible for the forest.”

And of an uncompensated disservice:

“... smoke from factory chimneys ... in large towns inflicts a heavy uncharged loss on the community, in injury to buildings and vegetables, expenses for washing clothes and cleaning rooms, expenses for the provisions of extra artificial light and in many other ways ...”

Pigou had hit upon the modern notion of economic externalities, changes in welfare due to unintended side effects—often of an environmental nature—that are not directly captured in the market transaction itself. Externalities provided a powerful way of incorporating environmental damage into economic assessments. Also, externalities, because of their connection to production prices and quantities, suggested remedies, such as taxes, that could be used to reduce environmental damage. Likewise, subsidies could be paid to resource owners to encourage the production of amenity goods, such as forest aesthetics, for which no cash market exists.

The Years Following Silent Spring

In response to Rachel Carson’s book Silent Spring, the academic community began producing scholarly works which revived and adapted the older theories of Malthus, Mill, and the neoclassicists to modern situations. Below are important examples of the resurgence of the three theories during the post-Rachel Carson years.

Malthus

Certainly the most ubiquitous of the three theories in the post-Rachel Carson environmental literature was that of Malthus. However, the basic Malthusian theme of increasing resource scarcity was modified to present a modern, neo-Malthusian perspective. Thus, in addition to the traditional population concerns, world calamity could result from environmental degradation which also diminished the natural resource base.
Neo-Malthusian concerns were clearly evident in entomologist Paul Ehrlich’s (1968) best-selling book The Population Bomb. Its message was purely apocalyptic: there were too many people on the earth and because of a decrease in the doubling time of population growth, the situation was worsening every day. Within the next nine years the world would see acute food shortages where one in every seven persons would die from nutrition-related causes. The dreadful effects of overpopulation would not be limited just to starvation. The environment would deteriorate, too, as mankind used more fertilizers and pesticides, cleared forests, increased the siltation of streams, encountered the greenhouse effect, and engaged in nuclear warfare.

Another appearance of the Malthusian theme in the post-Rachel Carson literature was found in the Club of Rome-sponsored study The Limits to Growth (Meadows et al. 1972). The study used an MIT-based computer model which had several scenarios of future world resource stocks and population. Just beyond the year 2000, according to the model, food production and industrial output suddenly declined, triggering a 50 percent reduction in world population beginning in about the year 2030. Increasing population and industrial production in grim Malthusian fashion would severely outstrip limited natural resources thus crashing human civilization. In their attempt to save the human race, the researchers devised and fed to the model other more optimistic alternative future scenarios, but the final outcome was always the same. At some point during the 21st century, natural resource stocks would drop, followed by a dramatic population decline.

Mill

Mill’s theory about the steady-state economy had been largely discarded by neoclassical economics. In 1973, however, economist Herman Daly published an article titled “The Steady-State Economy,” acknowledging J. S. Mill as his intellectual forerunner. His solution, like that of Mill, was the steady-state economy, where humanity would strive for the maintenance of a constant population level, a constant stock of physical wealth, and a more equitable distribution of economic production among the members of society. In place of economic growth, Daly, like Mill, recommended moral growth where anxiety about material trappings was replaced with a concern for some higher and greater good. The writings of Daly were responsible for the modern revival of the steady-state theory.

Neoclassical Economics

Neoclassical economists made some important contributions to environmental theory during the 1950's. In particular, they had come to recognize the common property nature of many environmental resources as the root cause of many economic externalities (Gordon 1954). Since the oceans and the atmosphere belonged to everyone, hence to no one, they were freely exploitable. Common property then was seen as a type of market failure (i.e., no defined property rights) which could reduce social well-being.

Despite these advancements of the 1950s, it was not until the mid-1960s that neoclassical economics developed a specialized branch called environmental economics. Certainly, economic externalities had remained a constant part of the standard university economics curriculum throughout the middle part of the 20th century. But with interest stimulated by Silent Spring, the study of natural resource and environmental economics accelerated rapidly at universities, government agencies, and especially at Resources for the Future, a Ford Foundation think-tank located in Washington, D.C. The ideas of A. C. Pigou were often cited as the foundation of this newly established discipline within mainstream economics called environmental economics (Fisher 1981).
Economics and Environmental Thought Today

Perhaps the most important point to understand about the Malthusian doctrine is that it is a hypothesis (Barnett and Morse 1963). Thus, as with any hypothesis, it is subject to empirical testing. Barnett and Morse (1963) did in fact test the Malthusian hypothesis with data for the U.S. and found that between 1865 and 1957 most natural resources (the exception being forestry products) had not become scarcer, but instead economically more plentiful. The lack of scarcity was evidenced by both declining extraction costs and resources prices for the resources in question. The reason the Malthusian hypothesis had failed was that rising resource prices had induced new resource discovery, substitution and more efficient technologies which had lowered extraction costs. However, because resource consumption and population growth continue to be major social concerns, the Malthusian hypothesis will always be with us. Indeed, tests of the scarcity hypothesis are a continuing part of modern economic inquiry (Cleveland 1991).

Some 20 years ago, Herman Daly restated Mill’s thoughts on the steady-state and the old ideas found new acceptance. The relatively new school of ecological economics, of which Daly is a founder, is perhaps the most rapidly growing branch of economic thought with respect to the environment. Like Mill, the ecological economists seem to support, among other things, voluntary constant rates of population and wealth accumulation, and a more equitable distribution of the world’s wealth. The ecological economists also have promoted the development of national income accounts which reflect resource degradation and depletion, and more incorporation of biology into economic studies (Costanza 1991). Mill’s theory, as rediscovered by Daly, has greatly influenced sustainable development, the social movement aimed a balancing economic development and environmental health, which currently enjoys worldwide popularity (World Commission on Environment and Development 1987).

The neoclassical school continues to define the great majority of university economics programs. Thus, modern neoclassicism must be regarded as the dominant economic paradigm. Students wishing to study environmental economics draw upon the line of scholarly thought which traces back to the contributions of Pigou and the neoclassicists (Fisher 1981). The body of academic literature generated by environmental economists includes numerous textbooks, hundreds of monographs, and more than 250 related articles per year carried in some two dozen scholarly journals (de Steiguer 1989). Perhaps one of the greatest practical successes of environmental economists—that is, of putting theory into action—was the provision for marketable pollution permits in the Clean Air Act of 1990. Long-favored by mainstream economists as the most efficient method of reducing pollution, marketable permits set over-all acceptable levels of pollution reduction, and then allow polluters to bargain amongst themselves in order to achieve these desired reductions.

Despite the academic and policy successes, however, mainstream economics has sometimes had difficulty establishing itself in major environmental science programs (NAPAP 1991). The reasons for economists lack of participation in these programs are not clear; however Norton (1991) has suggested that environmentalists have not always viewed economists with favor. If there are differences here, they should be resolved. Society would have something to gain from closer cooperation among economists and scientists on environmental studies.

A Comparison of Theories

There is an inclination to ask, which economic theory seems best for today’s world? In fact, this is probably not the appropriate question. Malthus had a hypothesis, Mill a philosophy, and the neoclassicists a quantitative model for testing hypotheses and making decisions. The more appropriate question is: what can each contribute to the solution of environmental problems? From Malthus, we
derive an unyielding sense of urgency regarding environmental matters. His hypothesis provides a
haunting image of what might be should we fail to take natural resource and environmental matters
seriously. Malthusian-like concerns no doubt provide the impetus for much of the modern
environmental movement.

Modern neoclassicists have been able to bring practical skills to environmental matters. They have
been able to suggest specific methods of analysis to determine the economic importance of
environmental damage, to examine the trade-offs required to control losses, and also to suggest
specific policy instruments for reducing damages. These mainstream economists will continue to
provide essential information to elected officials who must draft and vote on environmental legislation.

The most meaningful legacy of John Stuart Mill is his expression of faith that humanity can control its
destiny. Far from being simply economic man—that pale wraith of a creature who follows his adding-
machine brain wherever it leads him (Heilbroner 1986)—Mill's person had a heart and a mind to make
intelligent choices which might involve denial of material needs. To many people, Mill's work
represents something more than an optimistic ideal; it may prove the solution to our environmental
problems.

**Literature Cited**


Christensen, P. 1991. Driving forces, increasing returns and ecological sustainability. Pages 75-87 in
Ecological Economics: The Science and Management of Sustainability. Columbia University

Cleveland, C. J. 1991. Natural resource scarcity and economic growth revisited: economic and


Daly, H. E. 1973. The steady-state economy: toward a political economy of biophysical equilibrium
and moral growth. Pages 149-174 in Toward a Steady State Economy. W. H. Freeman and
Company, San Francisco, California.


Ehrlich, P. R. 1968. The Population Bomb. Sierra Club and Ballantine Books, New York, New
York.


NAPAP. 1991. The Experience and Legacy of NAPAP. The Oversight Review Board of the National Acid Precipitation Assessment Program. Washington, D.C.

