

ECOLOGICAL ECONOMICS

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Summary

Ecological economics arose in the final decades of the 20th century out of concerns for environmental protection and economic sustainability. It was largely a response to a real or perceived lack of physical and biological underpinnings in neoclassical economics. It was also intended to infuse economics with a moral philosophy, in contrast with the amoral implications of neoclassical models portraying man as a rational, utility-maximizing automaton.

Ecological economics is a transdisciplinary endeavor, incorporating and synthesizing concepts and findings from an array of natural and social sciences. Of particular importance are the laws of thermodynamics and basic principles of ecology. Limits to economic growth are thoroughly understood only via the first two laws of

thermodynamics. The first law establishes that there is a limit to the inputs required for economic production, and the second law establishes that there are limits to the efficiency with which those inputs may be transformed into goods and services. Similarly, ecological concepts such as trophic levels, niche breadth, and competitive exclusion are required for a thorough understanding of the relationship between the human economy and the diversity of nonhuman species, or the “economy of nature.”

Given its roots in the natural sciences and moral philosophy, the major themes of ecological economics are scale, distribution, and allocation. Scale refers to the size of the human economy relative to its containing, sustaining ecosystem. Because scale is limited – i.e., there is a limit to economic growth – the distribution of wealth is a topic that must be addressed, with public policy if necessary, if poverty is to be alleviated. Prioritizing scale and distribution distinguishes ecological economics from neoclassical economics, which posits unlimited economic growth and therefore implies that a “rising tide lifts all boats.” In neoclassical economics, the efficient allocation of resources among producers is the primary concern. Efficient allocation of labor and capital, especially, is thought to help maximize production and boost rates of economic growth. In ecological economics, efficient allocation is also recognized as an important objective, but the importance of land and natural resources as a factor of production is emphasized. Natural resources are found to be only partially substitutable by labor and manufactured capital. In ecological economics, individual natural resources are also scrutinized to determine if they have the properties necessary for being allocated efficiently in the market. Many natural resources and services provided by ecosystems (such as pollination, climate regulation, and water purification) are often found to be lacking such properties and are therefore overused or ignored unless protected by forces outside of the market.

Based upon its themes and findings, ecological economics produces a number of distinctive policy implications. Some new policies are required, and many existing policies must be reformed if the goals of sustainable scale, fair distribution, and efficient allocation are to be met. For sustainable scale, the vast array of fiscal, monetary, and trade policies that are designed to stimulate economic growth may be gradually re-adjusted to make them conducive to a steady state economy with stabilized production and consumption of goods and services in the aggregate. Additional policies such as caps on extraction and pollution may be necessary for assuring sustainable scale and more closely approximating optimal scale.

Facing limits to growth, societies are likewise faced with challenging choices about dealing with poverty. Progressive taxes are a traditional method for doing so. Caps on income and wealth, minimum income, and the distribution of returns from natural resources are additional options proffered in ecological economics.

For efficient allocation of resources, many of the policy recommendations stemming from “environmental economics,” or neoclassical economics as applied to environmental issues, are supported by ecological economics as well. These policies are focused on correcting for market imperfections of natural resources when it is feasible to do so. The contribution of ecological economics to the use of these corrective policies is primarily in the deeper understanding of the components, structures, and

functions of ecosystems that need to be evaluated in order to identify the corrective course. This understanding is usually procured through the collaboration of economists with ecologists, or by the cross-training of individuals in ecology and economics, and it is often used in estimating values of natural capital and ecosystem services in monetary terms. With such estimates, markets may be designed or modified to allocate the resources. However, in ecological economics, the need for non-market mechanisms for allocating or conserving some natural resources and ecosystem services is readily recognized, and regulations are viewed as efficient policy tools in many such cases, whereas the neoclassical faith in the market tends to dissuade the polity from adopting conservation regulations.

Ecological economics will be one of the most important endeavors of the 21st century as nations and the world population approach, breach, and adjust to supply shocks such as Peak Oil and environmental crises such as climate change. For numerous reasons including the vast reach of neoclassical economists in academia, commerce, and government, ecological economics will be challenged to avoid a pre-occupation with natural capital valuation exercises at the expense of its distinguishing emphasis on sustainable scale. Ecological economics has come along none too soon, as indicated by the fact that the steady state economy as a macroeconomic policy goal must also be reconciled with legitimate calls for economic de-growth.

1. Historical Development of Ecological Economics

Ecological economics arose in response to mounting environmental problems that were witnessed by the public and documented by scientists in books such as Rachel Carson's *Silent Spring* (1962), Barry Commoner's *The Closing Circle* (1971), and *The Limits to Growth* (1972) by Donella Meadows et al. Many observers were disappointed with the approach of conventional or "neoclassical" economics to environmental degradation, exemplified by Howard Barnett and Chandler Morse (*Scarcity and Growth*, 1963), who believed that prices in a well-functioning market would prevent crippling resource shortages. Neoclassical economists and business professors such as Julian Simon invariably prescribed economic growth as the solution to virtually all social problems, even environmental problems and especially pollution. According to them, conflicts between economic growth and environmental protection could be solved via technological progress.

One of the first well-trained economists to part ways with the neoclassical school on environmental grounds was Herman Daly, whose *Steady-State Economics* (1977) provided an alternative vision for a sustainable, equitable economy in balance with the environment. Daly was Professor of Economics at Louisiana State University when he wrote *Steady-State Economics*, and served as a Senior Economist at the World Bank from 1988-1994. His professional leadership and writing talents attracted many other economists, and also ecologists concerned with environmental protection. Ecologists found in *Steady-State Economics* a refreshing familiarity with the natural sciences as well as economic principles. Daly, a protégé of Nicholas Georgescu-Roegen (*The Entropy Law and the Economic Process*, 1971), was particularly adept with the laws of thermodynamics and the implications of thermodynamics for economic growth. Other

prominent and productive figures with similar emphases and outlooks included Kenneth Boulding, Robert Ayres, and E. F. Schumacher.

Key figures in the development of ecological economics assembled during the 1980s, most notably in Stockholm in 1982 (organized by AnnMari Jansson) and Barcelona in 1987 (organized by Joan Martinez-Alier). These meetings helped the participants to identify common ground, complementary skills, and major challenges to developing a more ecologically sound theory and practice of economics. Many of the attendees would become prominent contributors to the ecological economics literature and related institutions. One of them was Robert Costanza, who took the lead in establishing the International Society for Ecological Economics in 1988. Costanza was a student of the systems ecologist H. T. Odum (1924-2002) and brought his own mastery of thermodynamics with additional ecological and economic applications. Costanza served as the editor of *Ecological Economics* from its inception in 1989 until 2002 and has been one of the most prolific authors in the ecological economics literature at large.

The first ISEE conference was held in 1990, with bi-annual conferences held since. By 2007 there were nine ISEE-affiliated regional societies representing Australia-New Zealand, Argentina-Uruguay, Africa, Brazil, Canada, Europe, India, Russia, and the United States. (There was also a non-affiliated Chinese Ecological Economics Society and an Iberian and Latin American Network of Ecological Economics.)

With regard to the broader sweep of history, one of the more noteworthy roots of ecological economics was the work of Francois Quesnay and the physiocrats of late 18th century France. Quesnay was brought into the king's court as a physician and became a general advisor. He developed a strong interest in agriculture and, with his medical background, viewed the French economy as a circulatory system of goods and services, as described in the *Tableau Economique* (1759). The most important point of the *Tableau* was his designation of agriculture as the sole source of economic production, with all other economic activities deriving from that production.

Adam Smith met Quesnay and studied the *Tableau* prior to writing the *Wealth of Nations* (1776). Although he disagreed with Quesnay's categorization of agriculture as the sole source of production, he nevertheless described how agricultural surplus was necessary for the division of labor. There was no argument about the primacy of agricultural surplus among the classical economists, even in the midst of the industrial revolution, but as their studies of "political economy" splintered into neoclassical economics and political science at the dawn of the 20th century, microeconomics eclipsed the broader, integrated vision of the economy. Future economists would not be as familiar with the inter-relationships among economic sectors, much less with the natural sciences or agricultural practices. Meanwhile, much of the vacuum in political economy was occupied by Marxists and followers of Henry George, the latter calling for a singular and substantial tax on land rents in *Progress and Poverty* (1879).

When Henry George followed up on *Progress and Poverty* with political activism and attained broad support from populist followers, land barons teamed with hand-picked economists to downplay the role of land in economic production in order to refocus tax policy on wages. Many economics departments in the United States were in their

formative stages and the anti-George backlash manifested in the development of neoclassical economics. By the time macroeconomics was borne of the Keynesian revolution in the second quarter of the 20th century, agricultural economics was consigned to its own corridors. Among the broader economics community, land was generally overlooked as a factor of production while economists focused on labor and capital. War-time economics were especially focused on capital mobilization while the Great Depression prompted a focus on labor and employment. Furthermore, the developed countries were urbanizing at a rapid rate, with citizens evermore removed from the land. These developments in social and political context help to explain the growing propensity of 20th century neoclassical economists to underestimate the magnitude and implications of natural resource scarcity and environmental deterioration. Conversely in ecological economics, the fundamental requirement of agricultural surplus for a fully developed economy – and increasing surplus for a *growing* economy – is a cornerstone in the theoretical foundation.

One classical economist with exceptional relevance to ecological economics was John Stuart Mill. In *Principles of Political Economy* (1848), he synthesized the state of the art in economics to that time. He was also perhaps the first economist to advance with hope the notion of the “stationary state” as opposed to warning of it as had Thomas Malthus and David Ricardo, who pointed gloomily to the collision of population growth and agricultural capacity, prompting observers to refer to economics as the “dismal science.” Mill believed that an informed human citizenry could come to control its population, achieve a comfortable standard of living, then turn its attention to matters of social justice. The stationary state – a non-growing, non-declining economy – is synonymous for practical purposes with the steady state economy of ecological economics.

The role of Marxist thought in the development of ecological economics is not entirely clear. The founders of ecological economics recognized the pre-occupation with growth in capitalist (and other) economies as a major threat to the environment and society, so “green” Marxists were natural allies. On the other hand, Marx himself appeared to have substantial faith in technology to obviate limits to growth; his critique of capitalism stemmed more from his thoughts on the concentration of power and the maldistribution of wealth. One of the legacies of Marxist vs. capitalist ideology was an arms race between the United States and the Soviet Union, a Cold War in which the score was kept in terms of economic production. The pre-occupation of these powers with economic growth was one factor in speeding the human race into environmental deterioration, and into the study of ecological economics.

2. Approach and Philosophy of Ecological Economics

The general approach and philosophy of any endeavor are interrelated, so are treated here in the same section. Ecological economics has an approach and philosophy that distinguishes it from neoclassical economics and from most “heterodox” economics traditions such as the Austrian School, Keynesian economics, and Marxism. The approach and philosophy of ecological economics may be concisely described as transdisciplinary and normative, respectively.

2.1. Transdisciplinarity

Ecological economics is sometimes referred to as a “transdisciplinary” endeavor to distinguish it from a long line of “interdisciplinary” studies that arose in academia during the latter decades of the 20th century. The movement toward integration and synthesis of disciplinary studies in some corners of academia resulted from a concern that the policy implications stemming from reductionist science were impractical or misguided. Even numerous efforts at interdisciplinary studies were criticized for mere coupling of reductionist disciplines, however, and the transdisciplinary approach was advanced as cooperative problem-solving with dynamic integration of philosophical perspectives and scientific findings.

The concern with disciplinary reduction was especially warranted with regard to the ecological aspects of economic systems, because many national economies had grown to an extent that pushed the limits of sustainability, and global environmental problems related to economic production such as depletion of the ozone layer, biodiversity loss, and climate change were becoming evident. Most ecologists knew little about the economic processes giving rise to environmental problems, and most economists knew little about the severity of economic implications of ecological degradation. Many ecologists and economists knew little about the political and sociological influences upon their studies and their occasional policy recommendations. It was in this context that Daly, Costanza, Richard Norgaard and others advanced the concept of transdisciplinarity, which may itself be considered a theme or an emphasis of ecological economics.

Nevertheless, a transdisciplinary approach assumes there is something to apply it to, and ecological economics applies it to three primary themes, which may be summarized as scale, distribution, and allocation.

2.2. Ends, Means, and a Normative Stance

Perspectives on human nature and civil rights strongly influence how economic theory is developed, interpreted, and applied. Although there is no consensus in ecological economics about the spiritual origins or ethical nature of man, there is a general consensus that economics is irreducibly a normative endeavor, in study and in practice. This distinguishes ecological economics from neoclassical economics, in which man is modeled as “*Homo economicus*,” a self-interested, utility-maximizing automaton, with utility indicated by the consumption of goods and services. In ecological economics, man is viewed as having multifarious motives that derive not only from economic exigencies but also from evolutionary, cultural, and spiritual factors deeply embedded in the human psyche. Although the consumption behavior of humans may be modeled as an academic exercise, such modeling exercises produce few practical or dependable policy implications.

Given a broader view of human nature, a spectrum of ends and means helps to place the academic terrain in context. Sciences that reduce the sphere of observation to physical and biological minutia provide insights to the *means* by which various human goals and objectives may be pursued. However, the meaning of life and the corresponding *ends*

are beyond science to ascertain, and are often manifested in or interpreted through religion. Social sciences, interdisciplinary studies, and transdisciplinary approaches help to bridge the gap from reductionist science to meaningful lives; i.e., from means to ends. For example, physics is a study of ultimate means, theology is a study of ultimate ends, and social sciences including economics are studies of intermediate means (e.g., economic institutions) and ends (e.g., economic welfare).

Ecological economics explicitly and consciously encompasses a longer portion of the ends-means spectrum than neoclassical economics does. As ecological economics has arisen out of environmental concerns, the ecological expertise of its practitioners has been coupled with a closer analysis of all natural sciences of particular relevance to economic affairs, such as the laws of thermodynamics. In other words, ecological economics is concerned with ultimate means, virtually by definition, and how those ultimate means affect human economic prospects. Meanwhile, the normative stance of ecological economics requires a consideration of ultimate ends, including religious callings and needs. This is an ironic aspect of ecological economics to the extent that ecologists are often characterized as atheistic scholars with a purely evolutionary view of *Homo sapiens*. However, there are logical and faith-based reasons for linking ultimate means and ultimate ends in economic affairs, as revealed in the section below on the distribution of wealth.

3. Themes and Emphases in Ecological Economics

In conventional economics textbooks, economics is defined as “the allocation of scarce resources among competing end uses.” Neoclassical economics tends to be focused on the issue of efficiency; i.e., efficient allocation of resources. Neoclassical economists acknowledge the scarcity of resources at any given point in time – it is due to scarcity that efficient allocation is called for – but do not often acknowledge long-run scarcity of resources. Neoclassical economists usually posit that innovation and new technology continuously push back the limits to production and consumption that are temporarily imposed by scarcity.

Ecological economics, on the other hand, emphasizes the scarce resources that must be allocated. Long-run limits are recognized as well as short-term limits, giving rise to the “scale” issue. This acknowledgment of long-run limits to growth leads to a strong concern about the distribution of wealth, too (as will be shown below). The scale issue and the distribution of wealth provide the context within which allocative efficiency is assessed.

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Biographical Sketch

Brian Czech was born in Green Bay, Wisconsin, USA, on March 25, 1960. He has a B.S. in wildlife ecology from the University of Wisconsin-Madison, an M.S. in wildlife science from the University of Washington, and a Ph.D. in renewable natural resources with a minor in political science from the University of Arizona. He developed a focus on ecological economics during his Ph.D. research.

He is the founding president of the Center for the Advancement of the Steady State Economy (CASSE), a non-profit organization based in Arlington, Virginia. He is also a visiting professor in the National Capitol Region of Virginia Tech, Falls Church, where he teaches ecological economics, and is a certified wildlife biologist with 20 years of public service. Czech has helped to develop conservation policies and programs for tribal governments and at the national level. He is also the author of *Shoveling Fuel for a Runaway Train* and (with Paul R. Krausman) *The Endangered Species Act: History, Conservation Biology, and Public Policy*. As of 2008 he had more than 50 articles published in over 20 scientific and professional journals, indicating the transdisciplinary nature of his work. His emphases have been the ecological macroeconomics of biodiversity conservation, using theoretical and empirical approaches, and the political economy of environmental protection.

Dr. Czech has been an active member of numerous professional societies, including The Wildlife Society, American Fisheries Society, Society for Conservation Biology, International Society for Ecological Economics, and U.S. Society for Ecological Economics.

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