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"Summary of article by Robert Costanza and Herman Daly: Toward an Ecological Economics"

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Humanity's increasing impact on the earth's environment requires a further synthesis of the disciplines of ecology and economics. The most important theoretical issues that should be encompassed in this synthesis are "(1)sustainability; (2) inter- and intra-species distribution of wealth; (3) discounting and intergenerational justice; and (4) dealing with non-monetized values, imprecision, and uncertainty."(1)

Need for an Ecological Economics

Both the economic and ecological paradigms have fallen short of addressing many of the questions involved with human/natural resource interaction. In economics, "free marketeers" believe that environmental externalities are of little importance and can be adequately addressed by the invisible hand of the free market. Environmental problems are also seen as minor to Marxists, who argue that political education and better planning are simple remedies. In the field of ecology, questions about human cultural behavior are not commonly asked. Ecologists normally concern themselves only with the effects of human action *on* ecosystems, and not with an understanding of human behavior in the context of the ecosystems on which they depend. These combined shortcomings are serious, and extensive changes to each existing paradigm are necessary to alleviate them.

Major Issues, Problems, and Solutions

Economists have a long history of asking questions pertaining to natural resources, but attention in the present century has dwindled. Many problems arise when attention is diverted away from investigating human interdependence with the earth's environment. The following sections outline some of these major problems.

Sustainability: Maintaining our Life Support System

Economics should remind itself that nature is the economy's "life support system." By ignoring this essential link we could threaten the ability of natural life support systems to maintain themselves and the economies to which they are inexorably linked. David Pearce has

investigated the major economic structures of free market, planned, and mixed economies and has concluded that for the most part these structures are unable to guarantee sustainability. In Pearce's view, sustainability is inherently connected with a notion of justice within species, between them, and between current and future generations.

Intra- and Inter-Species Distribution of Wealth

"Wealth is ultimately the capacity to support life and the enjoyment thereof."(3) We generally do not conceptualize the sharing of wealth with other beings or future generations. When we do look at the lives of animals, we see that all members of these populations have more or less the same "standard of living." In addition, they live at roughly the same level of per-capita resource use, a level that does not change over time. Neither are animals split into classes that have varying degrees of access to natural resources. In the human case, per capita resource use differs widely for different social classes and is not at all constant over time. To maintain carrying capacity for an animal population, it is necessary to control population while keeping resource consumption constant. In addition, to maintain carrying capacity for the human race, consumption and income distribution need to be controlled in an equitable manner. Modern economics has paid little attention to such contentions.

Modern economics has determined that the human race should receive a continually increasing share of wealth. This assumption ignores the "instrumental value" that other species have in maintaining the earth's economies and life support systems, and ignores the intrinsic values of other species. In some cases, such as energy analysis, economists have attempted to calculate forms of intrinsic value based on embodied energy, but these examples are not widespread. Ecological economics can act as "a check on human perceptions," and "allow us to study the economies of nature which do not include humans."(4)

Discounting, Intergenerational Justice, and the Time Delay Trap

Intergenerational justice is an important foundation for an ecological economics. Issues in this realm have usually been addressed by discounting. The problem with discounting is that it reflects the value that the present generation places on future generations without the consultation of future generations. It should be recognized that the practice of discounting is just a numerical way to account for the value judgments that "(a) the near future is worth more than the distant future, and (b) beyond some point the worth of the future is negligible."(4)

Discounting may be a symptom of what is known as a "social trap." A "social trap" is "any situation in which the short-run, local reinforcements guiding individual behavior are inconsistent with the long-run, global best interest of the individual and society."(4) Sometimes these short-term incentives (money, social acceptance, physical pleasure, etc.) can be misleading. In such cases, too little importance is placed on the future and this "trap" is set. When economists and ecologists assume that individuals are optimizers and then interpret all behavior as optimal, they fall into this trap. Psychology has shown us that humans experience problems responding to situations that are not immediate. In this context we expect to see situations where the future is discounted too much, which may not be optimal.

A particular approach to discounting has been to discount future value by the rate of interest. This "provides an extremely tight link between ecological destruction and macroeconomic policy."(5) For an exploited species whose rate of population growth is less than the rate of interest, there is a high probability of extinction. Policy makers rarely consider issues such as the effects of US interest rates on deforestation in the Amazon, yet these effects are significant.

Non-Monetized Values and the Partial Quantification Gap

Not all values can be accounted for in monetary terms with the same level of precision. In many cases values that can be expressed more precisely dominate because they can fit into the models of the current paradigm more easily. This is an "unfair" advantage to precise numbers, and a compensating weight should be given to values that are more difficult to measure. The beginning of a solution to this problem is to be aware of and deal with the range of imprecision in all decisions by looking at all possible outcomes and to make decisions with those outcomes in mind.

Integration vs. Cross Fertilization

Some have stated that the disciplines of ecology and economics should fully integrate with one another, while others advocate cross fertilization whereby each discipline "borrows" necessary traits from the other. Much of the literature in ecological economics discusses how the concepts of ecology must be incorporated within those of economics, but in some cases, such as the use of input-output models, economics has been incorporated into ecology and used to evaluate ecosystems.

Extending the Classical, Neoclassical, and Marxist Analysis

Different economists have chosen a variety of starting points from which to begin an integration or cross fertilization of the two disciplines. Robert Goodland, and David Pearce are among those who attempt to expand neoclassical theory to incorporate concepts of sustainability and carrying capacity. Paul Christensen has pointed to modern energy analysis as an example of how classical economics can serve as a starting point. Robert Kaufman also refers to modern energy analysis as a starting point, but wonders if Marxist economics is the better point of integration.