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# Ecological Economics

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## In memoriam: Herman Daly (1938–2022)

Herman Daly passed away on October 28, 2022, at the age of 84 in Richmond, Virginia, of an inoperable brain hemorrhage caused by a fall. Though Herman was an exceptional human being whose moral values, respectfulness, humility, warmth, kindness, and caring nature made a deep impact on those who knew him, we focus here on his contributions to the field of ecological economics and to the advancement of the socially just sustainability transition upon which our future depends.

Born in 1938 in Texas (USA), Herman obtained a PhD in Economics from Vanderbilt University in 1967. There he met his influential mentor Nicholas Georgescu-Roegen – who was then writing his famous book *The Entropy Law and the Economic Process* (Georgescu-Roegen, 1971) – from which Daly learned how crucial it is to consider the material and energetic basis of economic processes.

Herman's sharp intellect and breadth of knowledge enabled him to make numerous significant contributions to understanding the biophysical foundations of economic production, while his moral values drove him to tackle the problems of just distribution and the desirable ends of economic activity, thus expanding the domain of economics to include ultimate means and ultimate ends (Daly, 1980). His writing skills and mastery of metaphor and analogy made those contributions widely accessible. Though his contributions have to date been largely ignored by both mainstream economics and policy makers, he had a profound on many other academics and activists around the world.

Herman's heretical views on mainstream economics took root early. Just one year after earning his PhD, he wrote *Economics as a Life Science* (Daly, 1968), helping to lay the foundations for ecological economics decades before the field was even named. He recognized the impossibility of endless economic growth on a finite planet and our dependence on natural systems for our survival. He discussed the concepts of the steady state economy and social metabolism. He stressed that the economy and human cultures are evolving systems while mathematical analysis—the foundation of mainstream economics—is ill-suited to understanding the dynamics of evolutionary change. He questioned marginal analysis and suggested that “it is better to make imprecise statements about unmeasurable but relevant magnitudes (use value, total utility) than to make more precise statements about the measurable but irrelevant magnitude (for evaluating total welfare) of exchange value.” (p. 395) He proposed extending Leontief's input-output models to include the contributions of natural systems. He presciently addressed the problem of climate change. He further developed these profound challenges to mainstream economics and many more throughout the remainder of his career.

Herman may be best known for his iconic image representing the pre-analytic vision of ecological economics: the human economy embedded in our finite planet, which provides all raw materials and most of the energy flows required for all economic production, and into which all our wastes are expelled. As we transitioned from an empty

world of small human populations with low levels of consumption into the full world of today, the economy did not expand into a void, but rather into our finite global ecosystem, displacing ecosystems in the process and degrading the life sustaining ecological functions upon which all species depend.

This pre-analytic vision led Herman to propose a steady state economy, first described in detail in his pathbreaking edited volume *Toward a Steady State Economy* (Daly, 1973), and defined as “an economy with constant stocks of people and artifacts, maintained at some desired, sufficient levels by low rates of maintenance ‘throughput’, that is, by the lowest feasible flows of matter and energy from the first stage of production to the last stage of consumption” (Daly, 1977). If endless quantitative growth is impossible, economies must focus instead on qualitative improvements, which he dubbed development. This is in jarring contrast to the vision of mainstream economists and most policy makers of an exponentially growing economy.

A master of metaphor and analogy, he likened the economic problem to that of loading a boat with cargo. The price mechanism is akin to allocating the cargo efficiently to keep the boat evenly balanced in the water. However, without any mechanism for determining how much weight the boat can carry, a boat risks being continually loaded with cargo until it sinks, inefficiently. What is missing from the market economy is a Plimsoll line, which on ships indicates how much cargo can be loaded before the boat becomes unsafe. If the available cargo space is limited, we must also decide how much should be distributed to each passenger. Markets tell us nothing about the planet's Plimsoll line and in practice systematically concentrate wealth in the hands of the few. Since market demand weights preferences by purchasing power, the more unequal the purchasing power, the less preferences matter, and the more markets will allocate commodities to the rich, who derive the least benefit from additional consumption. A steady state economy therefore requires non-market institutions to determine ecologically sustainable scale and ethically just distribution before we can possibly trust markets to efficiently allocate commodities to those who value them most. Since an ethically just distribution guarantees the satisfaction of basic human needs, markets are properly consigned to questions of individual tastes. Failure to achieve sustainable scale and just distribution leads to uneconomic growth, in which the ecological and social costs of additional economic growth come to exceed the economic benefits, leaving society worse off than it was before.

Herman firmly believed that economists should propose specific policies to achieve their goals and offered a list of ten policies required to achieve a steady state economy (<https://steadystate.org/top-10-policies-for-a-steady-state-economy/>). The first item he suggests is a cap, share and trade system. A cap set according to ecological constraints addresses the problem of ecologically sustainable scale. Equitable sharing of the caps addresses the problem of ethically just distribution.

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Markets then allow individuals to efficiently satisfy their tastes and preferences, best known to them alone. In distinct opposition to the notion of internalizing externalities by estimating monetary values for nature then feeding them back into the market mechanism, Herman argued that the scale of the economy must be priced determining, not price determined — prices can adjust to ecological limits far better the ecosystems can adapt to prices. We must try to internalize the economy into our natural systems, not vice versa. In practice, existing cap and trade schemes often start with unsustainable caps unfairly distributed and create opportunities for speculators to undermine efficiency. Herman was a staunch advocate of adaptive management to address such policy failures.

Other policy proposals by Daly include ecological tax reform ('tax bads, not goods'), income floors and caps to reduce inequality, re-regulation of international trade and finance, ending the right of banks to create and destroy money, free access to knowledge, and population stabilization. Together with his colleagues John and Cliff Cobb, Daly also developed the Index of Sustainable Economic Welfare (ISEW), which aims to correct GDP by subtracting from it the activities that damage our well-being while adding currently non-monetized activities that improve it. Daly recognized that ISEW and its close cousin the Genuine Progress Indicator (GPI) are consumption-based indicators of welfare with significant problems, such as the incommensurability of different costs and benefits, but saw it as a dramatic improvement over GDP. Four US states have so far adopted the GPI (unfortunately only as a complement to GDP), though Daly himself might well have preferred measures of well-being that include a variety of indicators, such as Italy's Fair and Sustainable Well-being indicator (BES). While some may consider Daly's proposals insufficiently radical to achieve a socially just sustainability transition, he believed that policies must start from historically given initial conditions.

Perhaps the greatest tragedy of Herman's career was the almost complete rejection of his views by mainstream economists and policy makers. At Louisiana State University, he was unable to advise PhD students because no other members of the economics department would pass a student who shared his views. Though he had tremendous support from natural scientists at LSU, such as Robert Costanza, John Day, Paul Templet and Roel Boumans, he left for the World Bank in the hopes of having greater influence on policy makers. Mainstream economists there also rejected his views, epitomized by the oft-told story of Lawrence Summers' refusal to expand a figure of a circular economy to acknowledge resource inflows from and waste outflows into our finite planetary system (Rees, 2016). Through his work with ecologist Robert Goodland and other like-minded colleagues, he did have some influence at the Bank, but was sufficiently frustrated to leave when Peter Brown, with help from Bob Costanza, created a position for him at the University of Maryland's School for Public Policy. Despite this support at UMD, he remained underappreciated. Costanza initially had to pay some of Daly's salary out of grants, even though Herman was among the most influential and globally recognized scholars in the program.

Fortunately, Herman has been highly influential outside of mainstream economics. He was a co-founder of the International Society of Ecological Economics at the end of the 1980s and an Editorial Board Member of the journal *Ecological Economics*. Both the Society and Journal attract a wide range of interdisciplinary scholars and appear to have a growing influence on policy and economic thought, particularly in Europe. Herman received over a dozen prestigious international awards for his work, including two honorary doctorates; the Heineken Prize in Environmental Sciences; the Honor Right Livelihood Award (widely known as 'the alternative Nobel Prize') for "defining a path of ecological economics that integrates the key elements of ethics, quality of life, environment and community"; the Medal of the Presidency of the Italian Republic; and most recently, the Blue Planet Prize. His clear vision of a "political economy of biophysical equilibrium and moral growth" (the sub-title of his first book) have inspired academics and activists around the world dedicated to understanding and managing the

interactions between humans and the rest of nature.

Herman challenged not only mainstream economic theory, but also mainstream natural sciences, or more specifically, the belief in determinism and scientific materialism. Many physicists believe in a deterministic universe, in which, if we knew the position and trajectory of every particle, we would know the past and future. Discussions of policy would be pointless in such a world. He took particular umbrage with natural scientists and philosophers who considered free will an illusion. He identified scientific materialism with the belief that all species are the result of random mutations and natural selection, in which case there is no objective distinction between right and wrong. If this were true, he argued, policy would be pointless, since we could not objectively distinguish between better or worse states of the world. Herman was deeply religious and believed that God and religion were the source of objective values. However, he was anything but close-minded. At the time of his death, Joshua Farley and Herman were engaged in an e-mail discussion of evolution, ethics and objective value. Farley argued that moral values evolved to promote collective action (a focus of ecological economics) over individual self-interest (the focus of mainstream economics). They both agreed however that the shared moral values motivating our pursuit of a socially just sustainable transition are what unite ecological economists as a group, and the fact we share these values is far more important than their origins.

Herman never stopped working toward a socially just sustainability transition and continued to be productive to the very end. He published well over 100 journal articles and nearly 20 books, including one of the first textbooks in ecological economics (Daly and Farley, 2004). He engaged Nobel (Riksbank) Laureates in Economics in important debates about economic growth and resource substitutability (Daly, 1997; Solow, 1997; Stiglitz, 1997). His earliest work is more relevant than ever, while some of his most recent work will be published posthumously. Though he had some impacts at the World Bank, Herman was primarily an educator and public intellectual, implicitly guided by Keynes' maxim that "practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist." (Keynes, 1936, ch. 24, section V) We can only hope this maxim proves true, and practical people of the future will be in his thrall.

Herman was fond of pointing out that humanity is never more than one generation away from the darkest ignorance if the current generation of humans fails to pass its knowledge on to next. What knowledge gets passed on is the intersection between what the older generation chooses to teach, and the younger generation chooses to learn. We are deeply grateful for what he chose to teach, and fervently hope this generation of economists and policy makers will choose to learn from him.

#### Data availability

No data was used for the research described in the article.

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