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Ecological Economics in Four Parables

Herman Daly [Emeritus Professor, School of Public Policy, University of Maryland, USA][1]

Introduction

Economist Joseph Schumpeter stated that analysis must be preceded by a pre-analytical cognitive act that he called "vision," in order for analysis to have something to analyze. Visions can be clarified by parables. A parable of course is a little story that teaches a big lesson that opens one's eyes. Parables do not have to be historically true stories, but the ones here considered are.

Part I contrasts the pre-analytic vision of ecological economics with that of conventional economics by recounting a true story about the drafting of the World Bank's *World Development Report* for 1992. That story serves as a basic parable by which to envision ecological economics as the study of the relationships between the economic subsystem (the economy) and the ecological parent system (the biosphere). Conventional economics sees the economy as the whole system, with nature fitted in as separated components---forests, fisheries, croplands, mines, garbage dumps, etc. Ecological economics sees nature, the biosphere, as the containing whole system into which the economy must fit and adapt, either well or badly.

Part II provides the beginning analysis of the ecological economics vision, how the parts combine to function as a whole, the metabolic dependence of the economy on flows of matter and energy from and back to the biosphere, on their scale relative to the containing biosphere, and the very radical policy conclusions and sequence that analysis reveals. Here the instructive parable is provided by the story of Samuel Plimsoll and the maritime institution of the load limit represented by the "Plimsoll line", and the absence in conventional economics of an analog to the Plimsoll line. What would such an economic analog look like?

Part III tells a tragic story about chemical engineer, Thomas Midgley, Jr., and the too eager reliance on technology as the sufficient solution to the problems revealed by analysis of the ecological economic

[1] Below is the email with which Herman Daly submitted this paper about three weeks before he died.

> Dear Edward,
>
> I hope that you are well and surviving still in our disintegrating world. RWER continues as a voice of sanity.
>
> I am still kicking, but slowly, which has its benefits.
>
> Attached is an article that I am submitting to RWER. Suggestions welcome.
>
> All good wishes,
>
> Herman

paradigm. It is a cautionary parable about the prevalence of unintended consequences, and the problems of ignorance and haste.

Part IV considers the philosophical and ethical foundations needed to support the radical policy reversals indicated by a scale-limiting economic analog to the Plimsoll line. Are there convincing ethical arguments to persuade the public to accept the needed policies? To what can one appeal in an effort to persuade? Here relevant parables are provided by the story of Alfred Russell Wallace vs Charles Darwin on the basic difference (as well as the many similarities) between humans and other creatures, and by the Leopold -Loeb 1924 “trial of the century.” These stories are parables in that they dramatically depict the morally unacceptable logical consequences of the denial of objective value that has become firmly embedded in the paradigms of biology (materialist Neo-Darwinism) and economics (individualistic subjectivism) separately, and now together are eroding the moral foundations of the combined field of ecological economics.

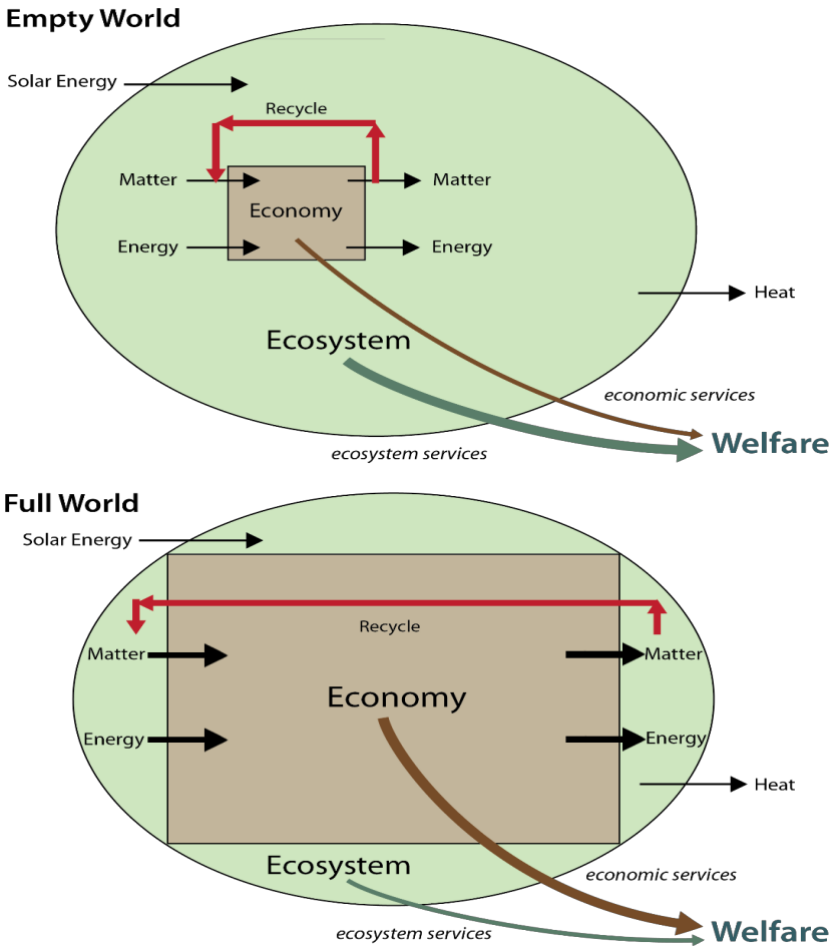
Part I: Pre-Analytic Parable: The World Bank’s 1992 *World Development Report*

Every year the World Bank publishes its *World Development Report*, dedicated to whatever topic the WB deems most important at the time. In 1992 the topic was "The Economy and the Environment". I was not on the team that wrote the Report, but was included in a panel of internal reviewers charged with commenting on successive drafts and suggesting improvements. I felt that this was my most important task at the time, and eagerly awaited the first draft.

The first draft arrived and I began reading. In the first chapter there was a diagram entitled *"The Relation of the Economy to the Environment".* The diagram consisted of a rectangle labeled "Economy", with an arrow entering from the left labeled "Inputs", and an arrow exiting to the right labeled "Outputs". That was it. Nothing in the diagram or accompanying text indicated what the inputs were, where they came from, what was going on inside the rectangle, what the outputs were, where they were going. And even if that were accepted as a bare-bones representation of the economy, where was the environment? It was simply not there! Undefined inputs came from nowhere and undefined outputs went nowhere, after passing through an empty box. Not a helpful diagram.

After recovering from my disappointment, I said to myself, OK this is only a first draft, and the title of the diagram is on target even if the diagram itself is vacuous. So here is my chance to make some helpful suggestions for how to improve the initial diagram, and give a better pre-analytic vision to guide the subsequent Report.

Here are my suggested revisions with a bit of supporting commentary and evidence from events after 1992.



Let's draw a big circle around the rectangle and label it ""Environment". The Earth-environment, let us say, has one input from space, solar energy, and one output back to space, waste heat. No significant material inputs from or outputs to space.[2] Materials circulate as energy flows through the environment. The inputs to the economy come from the containing finite environment and constitute depletion, a cost. The final outputs return to the environment as wastes and constitute pollution, also a cost.

For now, focus on the upper "empty world" part of the diagram. The economy (brown stuff, consisting of human bodies and manmade artifacts) is made from matter and energy taken from the environment (green stuff). Thanks to the first law of thermodynamics (no creation or destruction of matter-energy) more brown stuff necessarily means less green stuff. In physical dimensions the economy is an open subsystem of the environmental biosphere (i.e., it both receives matter and energy inputs and returns matter and energy outputs to the larger system).

[2] True, an occasional meteor hits the earth (a dangerous involuntary material import) and a few moon rocks were voluntarily imported and now decorate a stained-glass window in the National Cathedral. A few rockets and rovers have been exported to space. A lot of satellites, as well as material detritus, are circulating in earth orbit. Whether we consider material in earth orbit as part of the earth or outer space can be debated. Currently a few billionaires are fixated, along with NASA, on space colonization as necessitated they believe by our overconsumption, overpopulation, and continuing commitment to growth. The problem is real, but their solution is delusional, as is the expensive technological effort to migrate to where few intelligent people want to go, and to discover “if we are alone in the Universe”.

People die and artifacts wear out or are used up, so there is an inevitable outflow of degraded waste from the economy back to the environment. If the inflow of production and reproduction is equal to the outflow of depreciation and death then the economy (stocks of people and artifacts) remains constant in physical size, a steady state. If inflow is greater than outflow it grows; if less it declines.

In addition to the quantitative difference between inflow and outflow there is also a qualitative difference. The inflow consists of useful natural resources, the outflow of useless wastes. Usefulness is closely correlated with low entropy, and uselessness with high entropy.[3] An economy cannot directly reuse its own wastes any more than an animal can directly re-ingest its own excrement, or a car can run on its own exhaust fumes. This follows from the second law of thermodynamics, the entropy law.

It is true that waste matter is ultimately reused, but only after having been decomposed and restructured by biogeochemical cycles powered by the sun. Solar energy arrives in low entropy form and exits the earth in high entropy form. Accumulating carbon dioxide in the atmosphere from burning fossil fuels slows down the outflow of heat, forcing a rise in temperature and consequent climate change which has huge economic consequences. Energy is not recycled whether from the current solar flow, or from the stored sunlight of Paleolithic summers concentrated in the form of fossil fuels. As shown in the diagram only matter is recycled, often advantageously, but is far from completely recycled—about 35% for municipal solid waste in the US. Furthermore, it requires an increase in energy throughput, as well as the wearing out of material implements, to carry out the limited recycle. Money flows in a circle. Physical resources ultimately do not. The current enthusiasm in some quarters for a fully “circular economy” is quite misleading, as is the circular flow diagram in the first chapter of mainstream textbooks.

So far, our diagram is in physical terms only. The economy thus appears as a giant machine for converting useful resources into useless wastes---an idiotic process. To make sense of the economy we must recognize that the ultimate value product of the economic process is not a physical thing, but a psychic experience, the conscious enjoyment of life, represented by the word "Welfare", placed outside the circle of biophysical things. But we are not disembodied spirits. As physical earth-beings our enjoyment of life depends on our physical maintenance, and requires the services of both the natural ecosystem (green arrow to Welfare, e.g. clean air and water) and the services of artifacts that we have produced (brown arrow to Welfare, e.g. bicycles and cell phones).

Looking now at the lower "Full World" version of the diagram we might ask how much larger is the economy than previously. World population in my lifetime has quadrupled, from 2 to 8 billion. That has never happened before. Populations of cars, houses, cell phones, etc., have far more than quadrupled in my lifetime. Human biomass plus that of our cattle, now accounts for some 96% of all mammalian biomass (36% human, 60% cattle, soon to be converted to human biomass). Only 4% is left for wild mammals. As for birds, 70% are chickens and other poultry, with only 30% wild birds.[4] As noted above the atmosphere is now so full of greenhouse gasses that it is altering the climate in extremely costly ways. The world is clearly full in the stock dimension of populations of people and our produced goods and "bads". As a consequence of the larger stock dimension there is an increased flow dimension of the throughput necessary to maintain the larger stocks. More depletion and more pollution of the smaller remaining biosphere means a reduced flow of ecosystem services. This is obvious without monetary measurement.

[3] Nicholas Georgescu-Roegen, *The Entropy Law and the Economic Process*, Harvard University Press, 1971.

[4] https://www.ecowatch.com/biomass-humans-animals-2571413930.html

Continuing with the "full world" diagram, we see that the larger economy has increased the maintenance throughput (more depletion and pollution, larger throughput arrows). The larger economy also increases the flow of economic services, but the consequently smaller biosphere has diminished the flow of ecological services. If the physical growth of the economy results in an increase in the brown economic services arrow that is greater than the reduction in the green ecosystem services arrow then we have *economic growth*. Extra benefits greater than extra costs. If the reduction in the green ecosystem services arrow is greater than the increase in the brown economic services arrow then we have *uneconomic growth.* Extra costs greater than extra benefits. The optimal scale of the economy relative to the biosphere occurs when the sum of ecosystem services and economic services is a maximum.[5]

That completes my suggested revision of the original diagram of "the relation of the economy to the environment". I sent my suggested revisions off to the *World Development Report* authors with high hopes. When the second draft arrived, I saw that the original diagram was repeated, with no change in the text. However, a larger rectangle, unlabeled, now enclosed the original diagram, like a picture frame. With some annoyance I wrote back that my suggestion was not simply to put a picture frame around the diagram, but rather to specifically depict the most basic "relationships of the economy to the environment" and explain them.

Time passes and the third draft arrives. No more diagram. Completely omitted. No comment on my suggestions. They abandoned the whole idea of a visual representation of the relation of the economy to the environment. I was very surprised, but gradually began to understand why such a diagram simply could not be included, and why I was naive to have expected it.

Once you depict the economy as a subsystem of a larger system that is finite, non-growing, and materially closed (with a non-growing throughput of solar energy), then it is obvious that the growth of the economic subsystem is limited by the finitude of the containing ecosystem. It is also limited by the entropic nature of the metabolic throughput of matter-energy by which the economy is maintained. The goal of the World Bank and its member countries is growth. It serves this goal by making loans that must be paid back at interest made possible by the growth that the investment generates. To realize that not only is growth limited *physically* by finitude and entropy, but that it faces an earlier *economic* limit when the loss of ecosystem services begins to exceed the gains from extra economic services, is a large and bitter pill for the Bank to swallow. It is especially bitter in view of evidence that we have already reached the economic limit and that further growth has become uneconomic, at least in rich countries. So, you might suspect that the WB would advocate reduced resource throughput for rich countries to allow greater throughput in poor countries up to an acceptable standard of living. But no, the rich are urged to grow faster in order to provide markets for the poor to sell in, and to accumulate capital to invest in poor countries. The idea that growth in the global macro-economy could, even

[5] Rational humans could be expected, as growth continues, to satisfy our most important needs first, and to first sacrifice in exchange our least important ecosystem services, in so far as we are able. Therefore, marginal benefits of growth generally decline while marginal costs of growth increase, tending toward equality at the optimal scale. And on the subject of measurement, it must be noted that we have only incomplete measures of economic services, and extremely incomplete measures of ecosystem services. Nevertheless, real magnitudes do not cease to exist just because we can't accurately measure them numerically. We can see and feel their consequences. Also, in spite of Pareto, we know that a pin prick hurts Jones less than a leg amputation hurts Smith. Although analytic thought requires distinct definitions, dialectic thought can reason with partially overlapping categories. For now, we also leave this definition of optimum scale as purely anthropocentric, referring only to human welfare. But other sentient creatures both enjoy their lives and suffer—they have intrinsic as well as instrumental value. It is difficult to account for the welfare of all life beyond recognizing that steps toward counting welfare of non humans will require greater sharing of the earth with them, and consequently a lower optimum scale for humans.

theoretically, be *uneconomic* is very disturbing to economists. You will not (yet?) find the term "uneconomic growth" in the index of any textbook on macroeconomics.

But this is the basic message of Ecological Economics. The economy is a subsystem of the biosphere and has become too large to fit. We have overshot our ecological niche. Our major goal of growth has now become uneconomic, and growth must be replaced by shrinkage---or "degrowth" as some now say.[6] That is not as dismal as it might at first seem because Ecological Economics distinguishes between *growth* (quantitative increase in size by accretion or assimilation of matter), and *development*, (qualitative improvement in technology, design, and ethical priorities). Sustainable development in ecological economics is defined as development without growth (qualitative improvement without quantitative increase) ---still possible, but much slower and more difficult than the customary "development with growth" as measured by GDP.[7]

Part II: Analytical Parable: The Plimsoll Line

If we begin with the pre-analytic vision recommended above, rather than the vision of an empty rectangle receiving inputs from nowhere and sending outputs back to nowhere, then what analytic questions arise? Since the economy is now seen as a subsystem, the first question is, how large *is* the existing economic subsystem relative to the containing and sustaining ecosystem? Then, how large *can* it be without destroying the larger system with its entropic throughput of depletion and pollution? And, how big s*hould* it be to optimize total Welfare? This is the problem of Scale, completely ignored by mainstream economics, the so-called neoclassical-Keynesian synthesis. The next big question after Scale is what is the Distribution of ownership of natural resources among the population, and the Distribution of the income and wealth produced with those resources? The last big question is how is the resource throughput Allocated among the different goods produced? Does the menu of produced goods match the preferences of the people? In sum, what is the physical *scale* of the economy relative to the ecosphere, what is the *distribution* of income and wealth among the citizens, and what is the *allocation* of total output among different products. A good *scale* is at least sustainable, and hopefully optimal; a good *distribution* is fair or just; a good *allocation* is efficient.[8]

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[6] Timothee Parrique, *The Political Economy of Degrowth*,

https://www.researchgate.net/publication/339844751_The_Political_Economy_of_Degrowth/link/5e68d72a4585153fb3d61970/download

[7] A small like-minded group within the WB decided to provoke external debate with the message of the 1992 *World Development Report*, given that our internal efforts to influence it had failed. See Robert Goodland, Salah El Serafy, and Herman Daly, eds. Population, Technology, and Lifestyle : The Transition to Sustainability, Island Press, 1992, Washington, D.C. (Also published by UNESCO, 1991, Paris; under the title Environmentally Sustainable Economic Development : Building on Brundtland). This collection's authority was bolstered by the fact that it contained contributions by two Nobel laureate economists (Trygve Haavelmo and Jan Tinbergen), as well as a supporting introduction by the environmental ministers of two of the Bank's biggest borrowers (Emil Salim of Indonesia and Jose Lutzemberger of Brazil). But that was not enough to elicit any internal reconsideration of the World Bank's commitment to growth. A decade later in 2003 another *World Development Report* on the same topic was more willing to recognize some costs of growth, but was still firmly within the growthist paradigm. (See, "The illth of nations: comments on World Bank World Development Report, 2003", in H. Daly, Ecological Economics and Sustainable Development, Edward Elgar, Publishers, 2007.

[8] Herman Daly "Allocation, Distribution, and Scale: Towards an Economics that is Efficient, Just, and Sustainable," *Ecological Economics,* 1992 (December)

Mainstream economics has exhaustively analyzed the problem of efficient allocation, using the Pareto definition of efficiency, that is, an allocation such that any reallocation could not improve the welfare of one individual without reducing the welfare of some other individual. It follows that Pareto efficiency is defined only on the basis of a given distribution. Mainstream economists overwhelmingly focus on policies of efficiency of allocation, making some better off without making anyone worse off. Distribution is usually treated as given. Although questions of distributive justice are not ignored, and indeed have been increasingly studied by mainstream economists recently, they are correctly treated as matters of justice, not efficiency. Nevertheless, following Pareto, to objectively make some better off while making no one worse off is much easier with growth. More for some without less for others. That works as long as we allow scale to increase. But too large a scale means uneconomic growth. Ecological economics, by contrast, starts with the problem of sustainable scale, followed by that of just distribution. Only after social collective answers to these questions are given is the individualistic market allowed to seek an efficient allocation of goods, and even then, only of rival and excludable goods. Nevertheless, many necessary goods are both rival and excludable, so efficient allocation remains important.

To clarify, consider the analogy of loading a boat. Allocation involves apportioning the weight of cargo and passengers efficiently so as to maximize load carried without capsizing the boat. Distribution involves the apportionment of ownership of the cargo and cabin space among passengers, the rich and the poor, first class and steerage. Scale is the total load, the weight of cargo plus passengers, placed in the boat. Suppose we keep on loading the boat gradually, always allocating the weight efficiently and distributing it justly. Eventually the boat will sink, "efficiently and justly," to the bottom of the harbor.

Such overloading of ships is prevented by the maritime institution of the Plimsoll line. When the water mark hits the Plimsoll line the ship is fully loaded, it has reached its scale limit, even though the load is efficiently allocated and justly distributed. Samuel Plimsoll (1824-1898) fought in the English Parliament for many years to get a load limit law passed.[9] Ship owners preferred to overload ships, risking the lives of sailors while fully insuring the value of their ships, cargo and profits. This is an example of the "moral hazard" of insurance. Being insured against a hazard makes one less diligent in preventing it, and perversely increases the overall likelihood of the hazard. But sailors' lives lost were not counted as a cost to the merchants, nor insured for the benefit of the sailors' widows and orphans. Samuel Plimsoll was known as "the sailor's friend". The macro-economy has no analog to the Plimsoll line to prevent the growing scale of the economy from exceeding the carrying capacity of the ecosystem. Another parable coinciding with a historically true story.

So, the next question for analysis is what would such an economic analog to the Plimsoll line look like when combined with concern for distribution and allocation? We have a good clue from the cap-auction-trade systems that have already been applied to some resource flows, including petroleum and fish. A cap or quota is set on total extraction per year that is deemed within ecological carrying capacity-- in the case of oil the capacity of the atmosphere to safely absorb resulting CO2, in the case of fish at the estimated optimal sustainable yield. This is the scale limit. Second, is the distribution limit. Who owns the resource, and who owns the dollars that will buy access to the limited resource at auction? There are various possibilities for setting distributive limits. One is a minimum and maximum income---a limit to the range of inequality in incomes. Another is a wealth tax. Another is public ownership of the resource being auctioned. Third, the resource or the right to deplete it once purchased at auction can be resold to third parties in a free market. This permits efficient allocation in accord with differing individual preferences, differing technologies, and ability to pay. Market prices would allocate the

[9] https://blog.britishnewspaperarchive.co.uk/2013/02/10/samuel-plimsoll/

aggregate quota, they would not determine the size of the quota (scale), or the initial distribution of ownership and income, as they do now.

The logic of the cap-distribute-trade system was first described by Kenneth Boulding as an institution for limiting the scale of population while giving everyone the same right to reproduce, yet allowing these equally distributed rights to be reallocated by exchange or gift in the light of peoples' differing ability and desire to have and care for children.[10]

Although he knew it would have no political support as a population control measure, Boulding nevertheless saw it as a way of combining macro stability (limiting aggregate births to a replacement amount), while justly distributing ownership of the newly scarce right (everyone is given the same number of reproduction rights), while also respecting individual differences in ability and desire to reproduce (allowing market reallocation in conformity with preferences and ability to pay). The scheme respects and combines sustainable scale, just distribution, and efficient allocation. Although there has been no support for applying this imagined scheme to population control, it has been successfully applied to limiting pollution or depletion of some resources, as indicated above.

Many object to any connection between reproduction and markets as if any contact between money and births profaned the sacred. At the same time, however, we witness the *selling* of ova by young women in elite colleges, and of sperm by young men, to be combined *in vitro* by physicians *for a fee*, and then implanted in the *rented* womb of a surrogate gestational "mother". For some reason these very invasive ties between reproduction and markets elicit little opposition, often hailed as scientific progress, while Boulding's minimally invasive connection elicits vehement objection. Why is that? Perhaps because the aim of Boulding's plan is to limit aggregate births, as appropriate in a full world, while the aim of the medical market is to increase births, as might be appropriate if the world were still empty. As for the objection that it gives the rich an advantage in reproduction, remember that the rich always have an advantage in everything, and that the overall plan, as here modified, limits that advantage by restricting the range of income inequality between a maximum and a minimum income, as well as by equal initial distribution of the birth quotas. And, from the point of view of children, is it really so bad if as a result they are on average born richer rather than poorer? Also, Boulding's plan has no eugenic motivation, while the sperm and ova markets clearly do by advertising the qualities and accomplishments of the paid “donors”. A much more reasonable objection is that birth rates are currently declining without such an institution in response to increased education of women and availability of contraception, so for now just invest a lot more in education of women, which should be done anyway, independently of any consequences for the birth rate. Put the Boulding plan on the back burner regarding population, but don't forget it, and meanwhile expand its application to limiting the throughput of basic resources.

China's one-child policy was a much more drastic measure to lower population than the Boulding plan envisioned. A one-child family means no brothers, sisters, cousins, or aunts and uncles. When coupled with an unjust cultural preference for males, and the availability of selective abortion, it also greatly distorts the sex ratio, restricting future availability of marriage partners. Boulding's plan offers a less socially disruptive path to population reduction, should that ever become an accepted goal. I discuss the Boulding plan, not as a currently viable political alternative, but because it so clearly distinguishes the goals of sustainable scale, just distribution, and efficient allocation, and because its logic has already been applied to limiting scale of use of certain resources. Also, if it should ever be recognized as

[10] Kenneth Boulding, *The Meaning of the Twentieth Century*, Harper and Row, 1965. The broader application to pollution quotas was made in J. H Dales, *Pollution, Property, and Prices*, University of Toronto Press, 1968.

necessary to reduce the scale of population (as I expect it will be), it is hard for me to imagine a more just and efficient way of doing it. The reader os invited to do better.

Because of its partial reliance on the market for solving the allocation problem (in preference to central planning) the cap-auction-trade system has sometimes been labeled "free market environmentalism". This is totally misleading. It should rather be called "doubly constrained market environmentalism" because, contrary to the free market, there is a cap that limits scale, and a distributist institution that limits the range of inequality of ownership, or of income in general. The market is no longer free to determine scale or distribution, which it could never do acceptably in the first place.

Part III: Technological Parable: The Tragedy of Thomas Midgley, Jr.

A common reaction to the radical policy of limiting growth has been to emphasize the power of science and new technology to increase the productivity of a given throughput of resources. This is recognized and encouraged in ecological economics as qualitative development rather than quantitative growth. Without for a moment denying the benefits of technology, it is necessary to remember that new technology introduces novelty, something with which we have had no experience and consequently do not fully understand. It frequently has unintended consequences which can be very costly.[11]

Most people have never heard of Thomas Midgley, Jr., even though he likely had more impact on the atmosphere than any other human.[12] Midgley was a chemical engineer who worked for DuPont and General Motors.[13] He was given the task of eliminating engine knock, and came up with the solution of adding tetraethyl-lead to gasoline. It solved the problem by creating the bigger problem of spreading a neurotoxin all over the world in the exhaust of automobiles. Eventually, after 50 years and the spreading of 25 trillion liters of leaded gasoline, its use was banned. Next Midgley was given the job of finding a substitute refrigerant gas that was neither toxic nor flammable. He invented a good substitute, CFCs, (Freon) which worked well both as a refrigerant and as a propellant in spray cans. However, when it dispersed into the stratosphere it combined with ozone, reducing the capacity of the ozone shield to partially block ultraviolet radiation arriving to earth, thereby increasing the incidence of skin cancer. It too was eventually banned, but again it took nearly 50 years before Mario Molina and Frank Sherwood Rowland discovered the unexpected effect (for which they received the Nobel Prize in chemistry for 1995).

Midgley, an excellent chemist, found technical solutions to two fairly small economic problems that unintentionally created two very large ecological problems. As if that were not enough tragedy for one man, Midgley contracted polio late in life and was confined to a wheelchair. Being an inventor, he constructed a system of ropes and pulleys to hoist himself out of his wheelchair into bed. One night he got his neck tangled in the ropes and was strangled to death. This true story of unbearable irony serves

[11] Also increased productivity in using a resource lowers its price, which in turn increases quantity demanded, thus cancelling in part or in whole the reduction in use of the resource made possible by the technological improvement. In the 1866 words of William Stanley Jevons “It is wholly a confusion of ideas to suppose that the economical use of fuel is equivalent to a diminished consumption. The very contrary is the truth.” Jevons’ insight suggests an important advantage of quantitative controls over price controls—the blowback of greater consumption from the efficiency increase induced by the tax-augmented price is blocked by the quantitative cap.

[12] Frank A. Von Hippel, *The Chemical Age,* University of Chicago Press, 2020.

[13] For a fuller account of Midgley, see https://www.youtube.com/watch?v=IV3dnLzthDA

as another parable that warns against unintended consequences from technology-driven "economic" growth.

DuPont, General Motors, and Thomas Midgley, Jr. were trying to do good, but ended up doing harm because their vision of the economy was the same as that of the *World Development Report* discussed earlier---a system that converts undefined inputs into undefined outputs without recognizing the effect they have on the containing and sustaining biosphere. Chemists already knew that lead was a neurotoxin, and had they viewed the economy as a subsystem of the biosphere should have sought another cure for engine knock. Nobody yet knew about the effect of chloroflourocarbons on the ozone layer, but this parable of ecological ignorance provides further reason for the economy to expand slowly and carefully into the biosphere.

While much of pollution has traditionally been ordinary garbage and junk, much advertised “better living through chemistry” has given us novel pollutants with which the biosphere has had no evolutionary experience and to which it is consequently un-adapted. Non-degradable plastics, radioactive materials, agro-toxics, endocrine disruptors, etc. effectively fill the world in the sense of crowding out safe human and non-human habitation because some are deadly even in low concentrations of parts per billion or trillion.

Part IV: Ethical Parable: Darwin vs. Wallace and the 1924 Leopold-Loeb “Trial of the Century”

The pre-analytic vision and initial analysis of ecological economics given above are very simple, and the policy implications are very radical. The most radical policy implication is that growth, our major goal in the empty world, has become uneconomic in the full world. Growth now increases environmental and social costs faster than production benefits[14]. We should stop aggregate growth and begin to contract or "degrow", both in terms of per capita throughput and population. What happens to GDP as a consequence is of secondary importance. Climate change and loss of biodiversity are symptoms of the basic problem of overshoot, and overshoot means that the world is too full of us and our stuff[15] – too much *takeover* of areas capable of supporting current photosynthesis, and too rapid *drawdown* of the stored products of ancient photosynthesis.[16]

Growth has for two centuries been our *summum bonum.* Growth has been our attempt to solve poverty without sharing, our substitute for distributive justice, our cure for unemployment, and for inflation, our hoped-for cure for overpopulation via the automatic demographic transition, and our illusory means of imposing peace through military superiority. Growth has also meant human domination of the rest of nature (the anthroposcene), without a recognition of the consequent duty of humans to use our vastly superior capacities in service to the total creation of which we are a key part.

What ethical foundation can support such a radical about face? Does such a foundation exist?

Currently the ethical foundation of ecological economics is unsettled and eclectic. Many take the ancient materialist Epicurean and Lucretian view, most recently modernized in the neo-Darwinism preached by many biologists, that everything results from random mutations subject to natural selection by

[14] John Talberth, Clifford Cobb, Noah Slattery, *The Genuine Progress Indicator*, Redefining Progress, Oakland CA, 2006.

[15] William R. Catton, *Overshoot*, University of Illinois Press, 1980.

[16] Ecological Footprint, https://www.footprintnetwork.org/our-work/ecological-footprint/

differential reproductive success.[17] Objective value and ethics, beyond reproductive success, is considered meaningless. Humankind is considered ultimately no different from other creatures, a random consequence of blind evolution. Many ecologists have absorbed this worldview from their parent discipline of biology. Blind purposelessness, however, leaves no room for value. And without value the economy has no reason to be, other than to generate material waste, as we saw in Part I. So, the desired happy marriage between the disciplines of ecology and economics requires some serious marriage counseling.

Those ecological economists less enthralled by neo-Darwinism see humans as fundamentally different, as still part of the larger evolved creation to be sure, but a special creature who, like it or not, is effectively in charge of the larger creation, because far more than other creatures, humans reflect the image, albeit a broken image, of their Creator. Humans have conscious self-identity as persons, plus reason, language, law, literature, mathematics, history, science, music, art, etc. Ethics, in this view, derives from this special capacity and resulting responsibility to employ these unique gifts for the care and nurture of creation. Reducing humans to the level of other animals is false humility covering up irresponsibility. If we want to stop a bullfight we address our arguments to the matador, not to the bull.

Modern scientific materialism does not like the idea of Creator, even one who employs evolution as a means of creating. To speak of responsibility or blame is a further infraction of the rules of the naturalistic methodology---it is "unscientific." They believe that Chance and Necessity, natural selection, neo-Darwinism, is the correct and sufficient worldview. When confronted by other scientists with the extreme fine-tuning of the physical laws and numerous constants necessary for life, the materialists admit that the compound probability that life emerged in our universe by chance is infinitesimal. So, they postulate infinitely many (unobservable) universes in which the infinitesimal probability, multiplied by infinitely many trials, could, and evidently did, happen. We simply won the grand cosmic lottery---lucky us! Their pre-analytic paradigm of Materialism and Chance is very strong. It has, after all, led them to many powerful discoveries-- as well to a basic nihilism. Increasing power with diminishing purpose---what could possibly go wrong?

In popular discussion the Chance view is considered Scientific, the Purpose view Religious. In a deeper sense, however, each view is both scientific and religious.[18] For example, the independent co-discoverer of natural selection, Alfred Russell Wallace, concluded that the theory of natural selection, while certainly powerful, was nevertheless insufficient to explain the vastly superior capacities of humans over other creatures.[19] He invoked a spiritual dimension as a hypothesis supplementary to the insufficient hypothesis of materialist natural selection to explain the enormous human difference. The procedure is open-minded, but it lowered his prestige among the materialistic Darwinists.

And even Darwin, although remaining a materialist, nevertheless wrote to a correspondent:[20]

> Nevertheless, you have expressed my inward conviction, though far more vividly and clearly than I could have done, that the Universe is not the result of chance. But then with me the horrid doubt always arises whether the convictions of man's mind, which has been developed from the mind of the lower animals, are of any value or at all

[17] Richard Dawkins, *The Selfish Gene*, Oxford University Press, 1976.

[18] Neil Thomas, *Taking Leave of Darwin*, Discovery Institute Press, 2021

[19] Alfred Russell Wallace, *Darwinism*, (Chapter 15), 1889.

[20] Charles Darwin, *Life and Letters of Charles Darwin*, (1986), "Religion", in Francis Darwin (ed.), Vol. I, Ch VIII, New York: D. Appleton & Co. pp. 274–86.

> trustworthy. Would any one trust in the convictions of a monkey's mind, if there are any convictions in such a mind?

This is a curious statement. Darwin asserts an inward conviction that the Universe is not the result of chance. But he then disparages his own troublesome conviction as untrustworthy, having developed from a "monkey's mind." Yet he seems not to discount his own theory of materialist natural selection for that reason, although it must have come from the same "monkey's mind" as his other convictions. As others have asked, if my thoughts are reducible to matter in motion, then why believe any of them, including this one?

Ethics requires purpose, ordering of wants and actions relative to objective value, final causation, teleology, and a perception of ultimate value – all the things that the reigning naturalism and materialism deny. This vision leaves no room for objective value and a hierarchy of purposes in reference to which actions are chosen, as required by ethics. Ethics is doubly ruled out – if all is determined, then purpose is a non-causative illusion; if good and evil were non-existent then there would be no criterion by which to choose ethically, even if choice were possible. On what basis then could we argue for ecological economics and its policies rather than the current growth economy---or vice versa?

The idea of objective value scares us because we think, with some evidence, that it might lead to intolerance and persecution of those whose vision of objective value is different from ours. This is certainly a danger, but the larger danger is that in denying objective value we no longer have anything to appeal to in an effort to persuade. It is just my subjective preferences versus yours, and since there is by assumption no higher authority, we have nothing to point to in order to persuade, nor accede to in being persuaded. There is no alternative but to fight, either with force or deceit. A commitment to the reality of objective value, including our ability to reason together about it – however dimly it is perceived – is necessary to avoid arbitrary rule by force. This defense of objective value was cogently argued by C. S. Lewis.[21]

A frequent objection to the reality of objective value is the assertion that different religions and cultures have quite different values. If value were truly objective there should be agreement on basic values, not the disagreement that we allegedly observe. In an Appendix to the book just cited, Lewis counters this opinion by assembling over 100 very similar affirmations of objective values drawn from authoritative sources in very different cultures in very different times and places. He divides the statements into eight categories, the titles of which indicate the particular objective value illustrated: 1. the law of general beneficence (against murder, violence); 2. the law of special beneficence (to family, friends); 3. duties to parents, elders, ancestors: 4. duties to children and posterity; 5. the law of justice (sexual justice, honesty); 6. the law of good faith and veracity (truth telling, avoiding slander); 7. the law of mercy (for widows, orphans, the poor and sick), 8. the law of magnanimity (rejoice in the good fortune of others, without envy). Lewis considered this collection of diverse cultural affirmations of common values not as proof, but as supporting evidence for objective value. His main argument was logical rather than empirical, *reductio ad absurdum* or proof by contradiction ---assume the contrary (no objective value) and show that it leads to contradictions and absurdities, as done in the preceding paragraph, and the following one.

Some materialist philosophers and biologists teach that morality and free will, however commonly experienced across cultures, are illusions, but beneficial ones with survival value, they say, and therefore selected by their presumed contribution to reproductive success to fit our environment – our

[21] C. S. Lewis, *The Abolition of Man*, 1944, reprinted by HarperCollins e-Books.

randomly changing environment, to be clear. However, they do not go on to consider the consequences of our (their) seeing through the illusions. Can an illusion, even a "beneficial" one, be effective once it is exposed as an illusion? I doubt it. The consequences of drinking this poison were made strikingly evident in the 1924 Leopold–Loeb "trial of the century" of two academically brilliant young Nietzschean–Darwinist nihilists who decided to prove to themselves that they were free from the illusion of objective morality by murdering a young man.[22] The only defense that their attorney, the famous Clarence Darrow, could muster for saving the admittedly guilty pair from execution was that their actions were determined, that in the great chain of strict determinism '*something slipped*'. But why '*slipped*' if there is no objective norm to fall short of?

It is evident that the institutions and policies of an ecological economy in a full world, will require a much more solid ethical foundation than that prevailing today. Economics must rethink its reduction of objective value to subjective preference, and ecology must rethink its reduction of objective value to purposeless neo-Darwinist materialism.[23] To combat the force of growthism by appeal to subjective preference and/or materialist determinism will be futile. Political economy began as a part of Moral Philosophy. Ecological economics requires returning to that historical starting point and re-thinking economics in the light of ecology, philosophy, and religion.[24] It also requires the foundation of a pre-analytic vision of the economy as a subsystem of a finite sustaining biosphere subject to the laws of thermodynamics and ecology. In terms of policy, it means that qualitative improvement (development) must replace quantitative increase (growth) as the path of progress. All together that is a very big change!

What development policies are indicated by such a big change, assuming the ethical will to enact them? As discussed earlier the cap-distribute-trade system for basic resources provides a framework for capturing increasing scarcity rents from basic natural resources and redistributing them equitably, while at the same time allowing the higher resource prices to induce both greater efficiency and frugality. Resource caps to limit the throughput of basic resources, especially fossil fuels, are required to reduce the ecological overshoot and consequent climate and biodiversity disasters from which all countries suffer. In nearly all countries inequality in the distribution of income has become extreme, and aggregate GDP growth no longer offers the hope to reduce inequality in an era of uneconomic growth. Therefore, a limited range of inequality bounded by both a minimum and a maximum income seems a necessary sharing to elicit the cooperation of the vast majority of citizens in democratic countries.

Contraceptive education and devices should be made universally available so that every birth may be a wanted birth. The greater demographic problem for nations will be migration. Ecological disasters, wars, and failing states have greatly increased the number of migrants, many of whom are legitimate refugees. Any country that limits its own resource use, limits its births, and provides a minimum income to its citizens, as here advocated, unfortunately cannot long continue to welcome large numbers of immigrants. Instead of people migrating to countries whose policies respect objective value (if such countries exist), those good policies will have to migrate to all other countries. Development policy must stop persisting in further growth in an already full world. And to accomplish this Ecological Economics

[22] They were sentenced to life in prison where Loeb was killed by fellow inmates. Leopold was eventually paroled and in apparent repentance spent the remainder of his life as a hospital technician in Puerto Rico. Darrow later defended John Scopes from the charge of "teaching evolution" in the notorious "Monkey Trial" of 1925.

[23] See, for example, Thomas Nagel, *Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False*, Oxford University Press, 2012.

[24] Herman Daly, *From Uneconomic Growth to a Steady-State Economy*, Edward Elgar, Publishers, 2014.

needs to base its ethics on objective value, rather than subjectivist individualism or materialist neo-Darwinism.

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