

Redefining Sustainable Economies

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Outside radical economic proposals such as alter-globalization and socialist theories, the academic theory of ecological economics (EE) has established itself as one of the main alternatives – if not *the* alternative - to neo-classical economics, which currently reigns supreme both in university economic departments and international organizations, and also inspires the way global business is conducted. This essay will examine the principal contributions of EE, its complex relationship with neo-classical economic theories, and their competing claims to being *the* theory for sustainable development.¹

A Complex Positioning

EE shares numerous conceptual tools with neo-classical economics but it also offers many core critiques and promotes critical ideas such as the limits to the earth's carrying capacity and a market economy that is *socially* and *environmentally responsible*. In particular, these two theories share the following traits: 1) acceptance of an 'optimal level of pollution' that maximizes net social benefits; 2) environmental microeconomics and an emphasis on private property rights; 3) cost-benefit analysis as the principal motivation for economic actors; 4) economic evaluation of ecosystem services generally considered to be free, such as the water cycle, natural pollination, water filtration by plants and wetlands, buffering by ecotones and coastal zones such as mangroves and alluvial plains; and 5) concern over what Garrett Harding called "the tragedy of the commons," that is to say the degradation of natural areas and resources (e.g., the oceans, forests, and the atmosphere) that are freely accessible to all economic actors ("open access") and fall outside the regulatory mechanisms of the private ownership system. However, Paul Samuelson and William Nordhaus, the authors of the most widely used neo-classical economics textbook in the United States (now in its 18th edition), never once mention EE in their 750 page-volume, in stark contrast with the openness of established ecological economists such as Neva Goodwin, Jonathan Harris, Julie A. Nelson, Brian Roach or Marriano

¹ The main sources on ecological economics in French are: René Passet, *L'économie et le vivant*, Paris, Economica [Payot, 1979]; *Les grandes représentations du monde et de l'économie à travers l'histoire. De l'univers magique au tourbillon créateur*, Arles, Actes Sud, 2012 [Paris, Les Liens qui Libèrent, 2010]; Franck-Dominique Vivien, *Économie et écologie*, Paris, La Découverte, 1994 ; Éloi Laurent, *Social-Écologie*, Paris, Flammarion, 2012; Corinne Gendron, *Le développement durable comme compromis. La modernisation écologique à l'ère de la mondialisation*, Presses de l'Université du Québec, 2006; Gilbert Rist, *L'économie ordinaire entre songes et mensonges*, Paris, Presses de Sciences Po, 2010. As far as we know, the only translation in French of a full-length EE book is Robert Costanza et alii., *Vivement 2050! Programme pour une économie soutenable et désirable*, Paris, Les Petits Matins/Institut Veblen, 2013 [*Building a Sustainable and Desirable Economy—in Society, in Nature*, New York, United Nations, 2012.] Other useful sources include Jacques Le Cacheux.

Torras.² Clearly, despite sharing a common foundation with traditional economics, EE is also a distinct theory. In a 2012 essay published in the e-journal *La Vie des Idées*, Albert Merino-Saum and Philippe Roman shed light on this complicated position: “EE is [...] often presented as a ‘heterodox’ offshoot of environmental and natural resource economics. While this assessment is partially accurate, let us not forget that the pioneers of EE conceived of it as an attempt at integration that could include the neoclassical approach as one scientific contribution among others, all within an open and pluralistic framework.”³

Like neo-classical economics, EE recognizes four traditional forms of capital (human, social/institutional, built, and natural), but it emphasizes the fact that natural capital *frames and limits* economic and social development. For ecological economists, the system of production must take into account—that is to say, internalize—the economic contributions of ecosystems and recognize its dependence on natural resources and pollution sinks (i.e., the oceans, forests, and the atmosphere that absorb and filter industrial wastes and pollutants). This is why they propose a different hierarchy for these four forms of capital wealth: while orthodox economists subordinate nature and social well-being to the commercial sphere, EE considers the economy to be the means, society the goal, and nature the foundation and upper limit of all our activities. A visual representation of this hierarchy is expressed through the ‘ecological donut,’ whereby the economy deploys within an inner circle, embedded in the larger circle of society, itself embedded in the widest circle (expressing the limits of natural resources and sinks) of the environment. This visual is meant to communicate the idea that the economy is subordinate to societal goals and should not be disproportionate to its basis, the ecosystems that support it. It also illustrates the fact that nothing social or economical can live outside the realm of nature, thus directly attacking the anthropocentric paradigm of mainstream economics.⁴

Neo-classical economics rejects this notion of intrinsic limits, this form of bio-centrism and instead, adopts an anthropocentric and optimistic perspective based on the following assumptions:

- The instrumental rationality of economic actors is fueled by rational expectations and the search for maximum individual utility (well-being), individual cooperation and freedom (*Homo economicus*) that spontaneously maximize public benefits.
- The market tends by default, by nature, toward a state of spontaneous harmony (through the invisible hand), which leads to the *Pareto optimum*, an optimal state of equilibrium in which each individual’s utility (well-being) is maximized so that *any* modification of the general equilibrium would lead to lesser economic utility for some actors (and is therefore to be avoided).
- The market is organically regulated by price signals assumed to correctly express, for

² Paul A. Samuelson and William D. Nordhaus, *Economics*, McGraw-Hill, 2004 (18th ed.); Jonathan M. Harris and Brian Roach, *Environmental and Natural Resource Economics. A Contemporary Approach*. Armonk (NY), M.E. Sharpe, 2013 (3rd ed).

³ Albert Merino-Saum and Philippe Roman, « Que peut-on apprendre de l’économie écologique? » *La Vie des idées*, April 3, 2012, p. 3.

⁴ Costanza *et alii.*, 2013, *op.cit.*, p. 61. The best sources for visualizing sustainability are <http://computingforsustainability.com/> and Manuel Mann, *Sustainable Lens. A Visual Guide*, Dunedin, New Zealand, CreateSpace Independent Publishing Platform, 2011.

the most part, the relationship between supply and demand and the true costs of goods and services. In this system, prices expressed in symbolic transactional form (money, currency) are grounded on objective economic realities and transactions.

- A widespread natural balance exists between supply and demand, in which the former creates the latter (Jean-Baptiste Say's law).
- The largest trust can be placed in backstop technologies to remedy economic disamenities and negative externalities. This "techno-optimism" (or technoptimim) postulates that science and technology can respond to *all* environmental challenges, present and future, old and new. It rests on philosophical positivism and a Promethean ethics, as it expresses the technostructure's boundless confidence in its rationality, virtuous intentions, and intrinsic goodness. Brilliant Internet dissident Evgeny Morozov mocks this *Folly of Technological Solutionism* in his sardonically-titled *To Save the World, Just Click Here* (2013).⁵ Indeed, ecological modernization of the weak kind—the trust in the capacity of science and technology to address our environmental issues without structural changes to politics, society, power distribution and dominant cultural practices—is central to neo-classical economics. According to these views, nuclear energy, GMOs, nanotechnologies and climate-modifying technologies simply respond to market needs, and constitute the best objective response to a problem or an opportunity. In other words, the technostructure is not problematized; its moral, social and political implications are viewed as globally benevolent, and its autonomous dynamics and political rationale remain unseen. This (apparent) depoliticization of science and technology is central for neo-classical optimism.
- The free market economy rests on a series of infinities: growth can and should be infinite, consumers' needs and wants as well, and so are economic opportunities, science, natural resources, pollution sinks, and the substitutability among the different forms of capital.

In contrast, EE emphasizes uncertainty (of knowledge, of system dynamics), limits (of nature, science, growth, substitutability among the different forms of capital), and market contradictions. For instance, when it analyzes price formation, it considers the overall power dynamics (monopolies, monopsonies, market manipulations and "frictions," impact of marketing and mind manipulation, erosion of consumers' sovereignty, etc.), and does not automatically posit that price formation results from spontaneous adjustments between supply and demand. This critique of price signals extends to the dominant, accepted measuring of economic wealth. While neo-classical economists consider GDP to be a sound and trustworthy measure of national wealth, EE views it as a misleading indicator for the following reasons.

- It considers revenues and profits from social and environmental damage as wealth. Industrial and road accidents, social and domestic violence, guns, tobacco, drugs and alcohol and their health and legal consequences, the incarceration-security private complex, bloated "defense," "anti-terrorism," and "national security" budgets,

⁵ Evgeny Morozov, *To Save the World, Just Click Here. The Folly of Technological Solutionism*. New York, Public Affairs, 2013.

bureaucratic and legal chicanery, excessive and ostentatious consumerism, pollution and contamination: any social or economic activity that requires cleaning, mitigating, fixing, repairing, moderating or remedying is considered beneficial to growth in terms of the GDP's purely quantitative approach. It also makes light of the pain and degradation involved and creates a Kafkaesque universe. For instance, in June 2013, the European Union's European System of Accounts adopted a new measurement system (ESA 2010) in replacement of ESA95 for calculating member states' GDP, one that includes the (estimated) profits from crime, prostitution and drug dealing as creators of wealth! These statistical changes caused the official GNP of some countries (notably Belgium, Italy, and the United Kingdom) to suddenly grow by almost 2%! In a deliciously ironic twist, in November 2014, the European Commission required some countries, notably the United Kingdom, to boost their financial contribution to the EU budget based on these upwardly-revised GDP estimates.⁶

- It includes activities that do not produce true wealth but cause excessive consumption and resource use, and materialistic alienation. In particular, ecological economists denounce the pervasiveness of marketing, publicity, packaging and other activities that needlessly push consumption, waste, and Veblen goods (conspicuous consumption).
- It excludes unpaid interpersonal and community services such as household work, volunteering, and social care that make the existence better and sweeter, especially for family life, community life, and the vulnerable. In the dominant economic analysis, such activities make up much of the institutional and social capital yet they are still not recognized by the official moneyed economy.
- It ignores the social distribution of wealth, the Gini Index, and the day-to-day well-being of the population.

In sum, EE responds to neo-classical economics' Promethean views with the precautionary principle, measured confidence in technology, mindfulness of the fallibility of all human enterprises, and integrative approaches that put our all-too-human calculations and endeavors in perspective.

Respecting the Limits of Natural Capital

EE holds that the economy should operate within the limits of natural capital *flows*, without drawing from the non-renewable *stocks* of capital itself, or the slowly renewal stocks. (Properly speaking, natural stock and flow constitute the natural capital *reserve*). For example, annual deforestation should be limited to the number of trees that are replanted and those that reach biological maturity; fishing should also conform to the natural rhythm of the fish population's reproduction, migratory patterns, and interaction with their ecosystem and other species. Natural capital may come in two different forms: non-critical and critical. EE acknowledges many forms

⁶ On the inclusion of prostitution and drug trafficking in GDP calculations in Europe's new ESA 2010, see Mathilde Damgé and Samuel Laurent, "Sexe, drogue et trafics en tout genre bientôt dans le PIB européen, » *Le Monde*, June 6, 2014; United Kingdom Office for National Statistics, *National Accounts Articles. Impact of ESA95 Changes on Current Price GDP Estimates*, May 29, 2014. On the impact of these new accounting norms on the British contribution to EU budget, see Alexandre Pouchard, "Pourquoi Bruxelles réclame 2 milliards d'euros au Royaume-Uni," *Le Monde*, October 30, 2014.

of ‘critical capital,’ including (but not limited to) irreplaceable resources such as *fossil aquifers* or *paleowater* (water stored over eons in subterranean pockets that no longer replenish because geological conditions preclude or considerably slows down infiltration of fresh water), the ozone layer, and climatic stability. Some ecological economists subscribe to the notion of non-critical natural capital, such as obscure, “easily-disposable” species of insect or sponge, or some apparently marginal types of trees, birds, or wild grass. But many more underscore the importance of our “unknown unknown.” We don’t know the impact over time of such wanton degradations of the web of life, so they insist that precautionary principle should guide us. After all, there might be only six degrees of separation (or less) between the ‘lower,’ ‘discardable’ forms of life, the apparently irrelevant insect, and the welfare of the human species.

Therefore, the economy must integrate life’s biorhythms, natural time, and seasons. Our *oikos nomos* (the “management of the household/ community” according to Aristotle, and the etymology of the word ‘economy’) is tied to eternal sapience—the rhythms and limits of bio-organic life. These constraints stem from Earth’s carrying capacity, and they are expressed by the following concepts: the ecological footprint of our activities⁷, our ecological debt (our overexploitation of natural capital and natural sinks), and the overshoot day. “Overshoot day” marks the point at which, according to standardized calculations by the Global Footprint Network (the main authority on the subject), we exceed our annual quota of resources and reserves and start living on borrowed resources, mortgaging our future resources and transferring our excesses on vulnerable countries and communities by pillaging their resources and outsourcing our pollution.⁸ For instance, one of the reasons why the American industrial footprint declined per capita (though not in absolute terms) since the 1990s is because the United States exported a significant portion of its polluting industries to China, Mexico, and other developing economics. Since the concept of “the day of ecological debt” was first introduced in 1987, it falls ever sooner in the year: December 19, 1987, November 21, 1995, October 7, 2006, September 23, 2008, August 22, 2012, and August 14, 2014.

Thus, the concept of “overshoot day” expresses a structural injustice in the dominant system. It helps us to visualize and conceptualize environmental injustice and ecological debt across regions, countries, classes and communities. In fact, ecological debt represents a triple form of punishment: historical hegemony (from the north towards the south: colonial and neo-colonial pillage of natural resource, trade specialization in exports of primary goods), global projection of capitalistic power (from the rich to the poor across countries and within nations), and a general assault by humans against all other forms of life. The official market dissimulates these injustices, as the *structural* deterioration of natural capital due to harmful economic activities is not reflected in the official system of *price signals*. The market functions as a system of power that manipulates prices, one that hides negative externalities and perpetuates the confusion between price, cost, and value. In other words, the system of market price signals does not signal a spontaneous, objective and natural equilibrium among free economic agents, but rather it expresses a political balance of power and the structuring of the hegemonic system.

Although the concept of overshoot day has gained in popularity over time as an environmental

⁷ Mathis Wackernagel et William Rees, *Notre empreinte écologique. Comment réduire les conséquences de l’activité humaine sur la Terre*. Montréal, Écosociétés, 1999.

⁸ www.footprintnetwork.org/fr/index.php/gfn/page/earth_overshoot_day

indicator, it remains hotly debated and does not account for negative *social* externalities (workers' exploitation), which must be addressed in a distinct and complementary manner in order to provide a true and thorough assessment of economic activity. This process of integrating both environmental and social costs is referred to as "full-cost accounting," and to our knowledge it constitutes a relatively under-developed part of ecological economics.

Scientific Ecology and Sustainable Development

EE considers neo-classical economics to be overly reliant on formal mathematical models, narrow in its methodology and instruments, and with a disciplinary focus akin to disciplinary autism. EE for its part incorporates system analysis, thermodynamics, ecology, and the environmental sciences; it also opens itself up to related disciplines such as critical sociology, institutional analysis, behavioral economics, conservation psychology, environmental ethics, and environmental history. This approach warrants further discussion.

First and foremost, the type of system analysis adopted by EE allows for the identification of objective (that is to say, non-human) processes and a general dynamic that goes beyond neo-classicists' methodological individualism and anthropocentrism. Confronted with very real economic crises and multiple exceptions to their theoretical models, orthodox economists tend to absolve their construct of core responsibility, instead placing the blame on individual agents, or on sporadic and limited imperfections of the market system. In their view, these economic agents suffer from an asymmetry of information, seek rent and situational advantages, or behave in "suboptimal" ways, etc., instead of acting rationally according to the principles of competition or in accordance with academic theory. For instance, Milton Friedman blames the banking crisis of the 1930s on the politics of the U.S. Central Bank—a discrete agent, not the system, is responsible. To provide another example, French economist Pascal Salin argues that the Enron scandal in no way reflects the system's imperfections or a neoliberal culture of white-collar criminality but, instead, proves the system's tendency to self-correct. A key advocate of (economic) libertarian ideas in France, Salin argues that Enron workers who were robbed of their pension funds should have sought more information. He adds that after all, life is filled with risk, but he ignores the reality of casino capitalism and the fact that Enron workers were lied to and not allowed to withdraw funds from Enron stocks.⁹ In contrast with these neoliberal arguments (although Salin denies the existence of neoliberalism, his economics does reflect neoliberal tenets), EE underscores the imperfections *of* and *in* the market—or to be more precise, its *structural contradictions*. This insistence on the structural contradictions of the current system is a common point that EE shares with anti-capitalism and political ecology.

Next, borrowing from Nicholas Georgescu-Roegen, EE shows that *positive feedback loops*, that is to say the amplification of events by a system when the system is modified by inputs beyond a given critical threshold, compromises the natural environment when it is too stressed by our economy.¹⁰ In this context, a *positive* loop does not mean a *favorable* or a *good* one, but a *self-amplifying* mechanism. For instance, we keep dumping greenhouse gases in the atmosphere beyond the critical threshold of 350 parts per million—as of the time of this writing (November 2014), we have reached the 400 ppm mark. The accumulated GHGs affect climate stability as the

⁹ Milton Friedman, *Capitalism and Freedom*. Chicago University Press, 1971 [1962], pp.37-55; Pascal Salin, *Français, n'ayez pas peur du libéralisme*. Paris, Odile Jacob, 2007, pp. 114-32.

¹⁰ Nicholas Georgescu-Roegen, *La décroissance. Entropie. Écologie. Économie*. Paris, Le Sang de la Terre, 2011.

system's response is expressed as erratic, extreme, or unpredictable weather patterns and events. The Old Testament saying: "For they that sow the wind, and they shall reap the whirlwind" (Hosea 8:7, New American Standard Version) is an apt metaphor here. We will need more energy, labor and other forms of capital to maintain the same economic performances and face social and environmental costs.

To counter these excesses, EE proposes a steady-state economy, a complex core concept that may be explained as follows. The terms "decoupling" and "delinking" mean that a sustainable economy must separate (de-couple, de-link) the volume of inputs (the raw materials and energy used to create economic value) and outputs (the waste and pollution that result from the industrial process and value creation) from economic productivity (or value yield). EE embraces the goal of *material* and *energy descent*, that is to say the improvement of material and energy efficiency *per unit* (fewer commodities and less energy are used to produce the same amount of value, goods, and services), yet material and energy descent can remain a narrowly technical process. It is fine and good to use less input (de-couple material and energy input from value creation) to produce the same economic value, or more. However the Jevons paradox (or rebound effect) tells us that as cars, appliances or industrial processes become more energy- and resource-efficient, as we save money on them, we manufacture, sell, buy, use and discard more of them. For instance, consumers often buy a second big screen television, a bigger or a newer car with the money they save thanks to technological and price improvements, or they take another airplane trip, "since flights are so much cheaper than before."

What really matters to ecological economics is *global* material and energy descent: using less in absolute terms while maintaining (or even improving) value creation—in other words, a global and methodical dematerialization and decarbonization of the entire economy, coupled with less overall consumption. In short, we must do as well or better with less, guarantee the same level of well-being to the greatest number of people (this obviously entails a non-consumerist society otherwise the Jevons paradox kicks in) but with a *globally* reduced ecological footprint. EE pays particular attention to the energy conundrum, since energy is at the heart of our complex societies: the economy must be further "dematerialized" and "decarbonized" by the reduction of energy intensity (the amount of energy needed by our processes to deliver goods and services) and the improvement of energy efficiency (the ratio between energy use and value created).

The combination of inputs and outputs is called throughput, literally "that which goes through the economic system." It is the sum total of goods and commodities (inputs) that fuel the production system plus the system's wastes and pollution (outputs), and it defines our ecological footprint. Since our natural system has limited capacities (natural sinks like the oceans, forests and the atmosphere can absorb only so much industrial waste and pollution), achieving a sustainable (steady-state) economy in *developed* countries means radically disassociating production from throughput (inputs + outputs), ensuring the social distribution of wealth, stabilizing population growth, lowering consumption and changing the culture. (Obviously the situation is different in *developing* countries and warrants a separate treatment). The system can then reach a stable level where economic activity stays within the flow (not the stock) of renewable resources and the capacity of absorption of natural sinks.

These changes form the steady-state economy and because EE places it within a capitalist system, it contrasts as much with the neo-classical theory of infinite growth as with Serge

Latouche's anti-capitalist degrowth theory. Indeed, Latouche wishes to move away from capitalism, to break away from its paradigms, while EE seeks to reimpose its natural limits—in other words, to reform capitalism in order to save it from itself. Yet because of its emphasis on reducing consumption, EE partly overlaps with the “voluntary simplicity,” the “joyful frugality” movement represented in France by Pierre Rabhi and in the USA by Duane Elgin, among others.

Furthermore, according to ecological economists, the neo-classicists are forgetting the second law of thermodynamics (attributed to Sadi Carnot), which Emmanuel Prinet summarizes as follows: “The law of entropy states that every closed system deteriorates spontaneously and irreversibly. Energy dissipates and temperature gradients disappear, leaving a chaotic and thermodynamically stable space. In order to recreate order, a new source of energy from outside the system is necessary, and without this outside energy, nothing more can happen.”¹¹ Since the economy is a subsystem of the natural energy system, infinite growth is impossible. Aurélie Maréchal also touches on this neoclassical dilemma: “Traditional economists [...] conceive of and model the economic system as a cyclical and infinite flow of goods and services [...] In this approach, the economy is considered to be a closed, self-sufficient system”.¹² We would add that this approach also considers the economy a self-regulating system. On the other hand, EE views the current economy as a system that is subordinate, and open to, the bio-geo-chemical world, but this economic system suffers from entropic tendencies. In such a system, energy is not recycled; rather, once it is exhausted, it does not come back, and we must then use new, less profitable energy sources. The fossilized carbon (solid in coal, liquid or viscous in oil) continues its life-cycle as green house gas.

In humanity's unquenchable thirst for more resources, the ratio of energy return on energy invested (ERoEI) degrades over time, which is consistent with dominant theories of peak oil. In other words, under the present system, we are bound to always use more energy for expanding growth and consumption, but this scenario is untenable given the natural limits of resources and sinks. The IPCC's fifth assessment report (AR5), released in 2013-2014 leaves no doubt about the accumulation of anthropic (man-made) greenhouse gases in the atmosphere, and the dire consequences of our excessive industrial emissions.¹³

These biophysical constraints underpin the concept of a critical threshold. According to René Passet, one of a handful of French ecological economists of note, “the economy [...] confronts its true nature as a transformative activity involving ‘real’ resources and energies whose modes of reproduction it must respect over a very extended period of time; the paradigm that results is no longer a mechanistic one, but rather a biological one involving complex systems that ensure the continued survival of humanity via the survival of the biosphere to which humanity belongs.”¹⁴ Once this threshold is crossed and we reach the point of no return, the *ratchet effect* is set in motion and irreversibly alters the general equilibrium by blocking the way back to ‘normalcy.’ In other words, a minor modification of an already burdened natural system

¹¹ Emmanuel Prinet, « Développer une économie écologique », February 2004, http://equitecho.org/IMG/pdf_Developper_une_economie_ecologique_-_4D.pdf.

¹² Aurélie Maréchal, « Économie écologique : principes de base », *Etopia*, vol. 8, pp. 137-48, quote from p. 138. www.etopia.be/spip.php?rubrique412

¹³ See the IPCC's AR5 (2013-2014) at [www.http://www.ipcc.ch/](http://www.ipcc.ch/)

¹⁴ René Passet, « L'avenir est à la bio-économie », *Libération*, May 23, 2011.

provokes vast changes: the immediate cause acts as a catalyst for more extreme disequilibria and results in cascades of consequences that are, by all appearances, disproportionate. In systemic terms, a species can “suddenly” go extinct after a long time of accumulated stresses in its weakened environment. Or, as we add a small quantity of greenhouse gases to an already carbon-rich atmosphere, we may generate “disproportionate” events. Environmental change (or any change in general, for that matter) is not linear and proportional, but marked by thresholds, disruptions, and brusque leaps forward. For example, the bees’ colony collapse disorder that we’ve been observing for some decades *seems* sudden because of our willful, self-interested ignorance of the many ways (industrial monocultures, pesticides, landscape and biodiversity degradations) in which we have harmed their milieu over extended periods of time. Therefore, ecological economics recommends the following when dealing with bio-natural systems: complex system thinking, moderation, mindfulness of the long-term perspective and the long future, a longer timeline (much longer than the neurotic quarterly reports imposed by Wall Street and financial speculators, or the electoral time-line), minding the butterfly effect, and the precautionary principle.

Interdisciplinary Issues and the Necessity of Consilience

EE’s openness to other sciences, its inner polarity between mild reformers and more radical thinkers, and its internal doctrinal richness may force it to remain heterogeneous. For example, Robert Costanza proposes an economic valuation of ecosystem services, an instrument routinely used by neoclassicists; Joshua Farley focuses on the production of global public goods, Clive Spash wants EE to move towards social reformism; Juan Martinez Alier takes it in the direction of North-South justice and the alter-globalization movement, while David Korten and Eric Zencey overlaps with political ecology by denouncing the influence of big business on governments. Other EE advocates such as Simon Dietz and Daniel O’Neill also echo critiques of consumerism offered by critical sociologists and cultural critics.

Thus EE’s critics feel that its approach lacks methodological rigor, question its scientific credibility and policy relevance, especially since neo-classical economics, by contrast, centers around a long-established homogenous doctrinal core. According to E. Roy Weintraub (economics professor at Duke University and noted expert of mathematical economics and the history of the discipline), “what is taught to students, what is mainstream economics today, is neoclassical economics. [...] Its fundamental assumptions are not open to discussion in that they define the shared understandings of those who call themselves neoclassical economists, or economists without an adjective. Those fundamental assumptions include the following: 1. People have rational preferences among outcomes. 2. Individuals maximize utility and firms maximize profits. 3. People act independently on the basis of full and relevant information.”¹⁵ Clearly, E. Roy Weintraub articulates the domineering certitudes of a hegemonic discipline (“Its fundamental assumptions are not open to discussion...”) that is closed to competing views and automatically disqualifies heterodox thinking (“... those who call themselves neoclassical economists, or economists without an adjective.”). This exaggerated self-confidence translates into what is officially called “economics imperialism,” the application of neo-classical economics tenets to all areas of human behavior (sexual and mating rituals, health, diet and medicine issues, criminality, and all manners of non-economic behaviors).

¹⁵ E. Roy Weintraub, “Neoclassical Economics,” *The Concise Encyclopedia of Economics*, 2007. <http://www.econlib.org/library/Enc1/NeoclassicalEconomics.html>

In striking contrast to this doctrinaire stance, EE espouses pluralistic methodologies and inter-disciplinary dialogue, with economics as one discipline among others. For EE, this internal diversity does not imply methodological weakness; on the contrary, it is justified by the scientific principle of consilience. Indeed, EE believes that its economic postulates are validated by other disciplines, a “meeting of minds” that is referred to as *consilience*, that is to say, the trans-disciplinary convergence of conclusions concerning the same questions. When a variety of sciences observing the same phenomenon consistently reach compatible or similar conclusions on said phenomenon, this indicates that their independent methods and discoveries are essentially valid. This kind of intellectual coherence helps establish the soundness of various disciplinary “silos” approaches. Thus consilience is science’s methodological (integrative) response to the necessary specialization of scientific disciplines and a remedy against disciplinary autism and atomism. For example, Darwin’s theory of evolution is confirmed *independently* by a variety of disciplines such as geology, genetics, biology, comparative anatomy, and paleontology. We will now discuss two examples of EE’s consilience with other disciplines and offer an interpretation.

Psychiatrist Eric S. Chivian (Harvard Medical School and Nobel Peace Prize 1985) and Aaron Bernstein (also from Harvard Medical School), led a large team of medical researchers, and offer numerous examples of how human medicine is *directly* dependent on *specific* organisms and plants.¹⁶ These ecobiologists emphasize the importance of protecting natural species with known benefits, and the importance of protecting species that remain unstudied but are likely to provide new benefits. Their call to *observe the precautionary principle on principle alone* underscores that the notion of the systematic (or even broad) substitutability among factors of production—a key concept in dominant economics—is erroneous. Conversely, their call for methodological prudence echoes a key tenet of EE: the (aforementioned) concept of critical natural capital. Between Descartes (who defined man as “master and possessor of nature”) and Francis Bacon (who said, “Nature, to be commanded, must be obeyed”), biologists and environmental economists alike choose the latter philosophy and reject the anthropocentric perspective of neo-classical economists.

Ecofeminist Erika Cudworth and International Relations theorist Stephen Hobden provide another example of consilience in their attempt to radically redefine the field of international relations by “transcending the powerful but nefarious dichotomies between the social and the natural worlds.”¹⁷ Insofar as they are not embedded within the natural world, social sciences (notably IR and economics) suffer from anthropocentrism, positivist rationalism, and a radical dualism of man versus nature. The very concept of what constitutes a human being is not objective and universal; rather it “is a social construction connected with power formations.”¹⁸ Critical theories, post-colonial studies, eco-feminism, and radical ecology all help reveal the mechanisms of exclusion and domination that this concept implies. With regard to the dominant rules, the normative “typical human being” is deemed to be a heterosexual male, a hyper-

¹⁶ Eric Chivian and Aaron Bernstein eds., *Sustaining Life. How Human Health Depends on Biodiversity*. Oxford, Oxford University Press, 2008.

¹⁷ Erika Cudworth and Stephen Hobden, *Posthuman International Relations. Complexity, Ecologism and Global Politics*. London, Zed Books, 2012, p. 6.

¹⁸ *Ibid.*, p. 23.

rational, calculating capitalist, a conquering individualist, an isolated agent, a hedonistic consumer, and so on. This fantasy construct, this human of reference justifies, on theoretical grounds, his domination of the Other—women, minorities, nature, and all living things. According to these two IR theorists, human societies and nature are “co-constitutive et mutually adaptable” and international relations “unfold and co-evolve with environmental and non-human systems”.¹⁹ Thus their “post-humanism” echoes EE’s critique of the disembodied, decontextualized hyper-rationalism and the anthropocentrism of conventional economics.

According to the EE perspective, social sciences must pass the test of consilience, and so EE identifies where and how neo-classical economics diverges structurally from what the biologist Edward Wilson calls “the unity of knowledge.”²⁰ For example, behavioral economics—the application of psychology to economic behaviors—, demonstrates the importance of ethical factors such as social ties, philanthropy and ethics for the economy. These key human motivations are neglected by *Homo economicus* theories, and they contradict the materialism and competitiveness of neo-classical views of economic agents. Some U.S. feminist economists, notably Julie A. Nelson and Juliet Schor show that the discipline of neo-classical economics itself is a gendered and subjective construct, that it expresses a narrow, given conception of masculinity, conceived of as calculating, atomistic, hierarchical and dominating. Given the gender bias at the core of neo-economics as a discipline, given that neo-classical economics gave rise to neoliberalism, it is easy to understand neoliberalism’s acceptance of (indeed, fascination with) financial speculators, hyper-aggressive managers and corporate gluttons who exhibit the pathological traits of toxic hyper-masculinity.

Faced with these accumulated arguments, neo-classicists counter with three powerful refutations that warrant consideration. First, they say, the capitalist system based on neo-classical doctrines has ensured and continues to offer well-being to hundreds of millions of people around the world. It lifted hundreds of millions out of poverty and so far has proven to be the best intellectual tool for sustained economic growth. Second, massive groups of consumers blithely carry on with their consumerist binge: consumers’ sovereignty definitely tends toward indulgence, over-consumption and materialism. Finally, emerging and intermediate economies embrace capitalism as defined by neo-classical views, and not based on ecological economics. These potent counter-arguments merit serious discussion if EE is to gain credibility among mainstream academic specialists and business actors.

Does ‘Scientific Objectivity’ Dissimulate Cultural Violence?

The following deconstruction of the concept of negative externalities, a key concept of environmental economics, illustrates how EE breaks with neo-classical economics. It also demonstrates EE’s potential for establishing a sustained disciplinary dialogue with critical sociology, critical ecology, hegemony and subaltern theories.

Neo-classical economics postulates that negative externalities, or environmental problems, can largely be resolved with free market solutions, notably the extension and clarifying of private property, the substitution among forms of capital, technical progress and ecological

¹⁹ *Ibid.*, p. 62.

²⁰ Edward O. Wilson, *Consilience: The Unity of Knowledge*. New York, Vintage, 1999.

modernization, price signals, and maturing growth (Kuznets environmental curve). Critical EE argues that the term “externality” implies that problems created by the dominant economic system occur *outside* of said system and that they are *accidental* and *unintentional*, when in fact they are *structural* and *deliberate*. In the mainstream economic approach, negative environmental externalities remain but an anomaly in the normal operations of the free market system. But Georgescu-Roegen, a key inspiration among ecological economists, long recognized entropic tendencies at the heart of the capitalistic system. Thus, the system’s so-called *externalities* are in fact *internalities*; they are conditions and core of the system of power, because in this system what is *negative* for the losers is *ipso facto beneficial* for the winners.

Externalities are conveniently named thus because they occur *outside the official boundaries of the market* (but only because it’s been wished by those who profit from it), outside dominant groups (humans versus nature and animals, men versus women, economics versus the environment), outside dominant regions (north versus south, global center versus global periphery), and outside the ruling class, but they are *central to their system of power*. Externalities are central to the current economy and its underlying economy of power. Thus, what first seems like just a conceptual tool of neo-classical economics, in fact, serves to conceal the unequal distribution of power that traditional economics implies and excuses. This way of disguising dominance relationships under the cover of ‘science,’ and this sterilization of technocratic language amount to cultural violence—to use Johan Galtung’s canonical term—and conceal structural violence. The economic scientific discourse is in fact constructed for cultural-normative manipulation and obfuscation on behalf of the hegemonic system.²¹ *The Guardian*’s Simon Jenkins puts it in starker, more combative terms: “[M]odern economists are mercenaries, the makeup artists of political prejudice. Before listening to an economist always ask who is paying the fee.”²²

In conclusion, the scope of EE is much broader than the core ideas outlined above. It includes a critique of the technostucture and Big Science, consumption and culture, marketing and credit practices. It also tackles demographic issues, the reduction of working hours, environmental legislation, taxes and customs tariffs, environmental democracy and justice, intergenerational equity, multiple-criteria analysis, social justice, and so forth. Inspired by the work of heterodox economists such as Frederick Soddy (Nobel Prize in chemistry 1921), Ernst F. Schumacher and Nicolas Georgescu-Roegen, EE takes up an old concern of the classical school: that of environmental sustainability. In Robert Malthus and David Ricardo, this central question produced pessimistic predictions of famine, strife, and diminishing rent and investment return. Later on, this central question was dismissed, hidden really, and almost forgotten, by the marginalist revolution of the 1870s-1880s (the intellectual foundation of neo-classical economics) because of their aggressive anthropocentrism and their obsession with physics, engineering, and mechanics (as opposed to the biosciences that inspire EE). Later still, Keynesianism did not fare much better with respect to a serious consideration of the natural limits to growth.²³

²¹ Johan Galtung, « Cultural Violence », *Journal of Peace Research*, August 1990, 27.3: 291-305, cf. p. 295.

²² Simon Jenkins, “Scotland’s new era beckons, regardless of how it votes in a stupid referendum.” *The Guardian*, May 29, 2014.

²³ Robert L. Nadeau, *The Wealth of Nature. How Mainstream Economics Has Failed the Environment*. New York, Columbia UP, 2003.

Neo-classical economics presents itself as a *positive* (that is to say, empirical) science. But, although it shares a foundation with orthodox economics, EE views this discipline as a *normative* undertaking that obscures, denies or obfuscates its preferences, partly because of its quest for scientific detachment, partly because of its involvement with the power system within academe and the market, which rewards conformist economists and sanctions dissenters (*incentivization* or *structures of incentives*, in the neo-classical jargon). To borrow loosely from environmental biology, ecological economics nowadays constitute an ecotope, a new life-system living between the world of orthodox economy and that of sustainable development.

A Glossary of Key Terms for Ecological Economics

Backstop technologies: New and emerging technologies that (are expected to) remedy existing environmental ills.

Capital (forms of): Four forms of wealth (natural, human-social, institutional, and built) that together contribute to economic development.

Carrying capacity: the earth's capacity to produce goods and services and absorb, metabolize, repair, and neutralize anthropogenic and natural degradations and pollutions.

Co-evolution: the notion that nature and society depend structurally on each another for survival, the notion that humanity is a major source of natural and planetary evolution.

Consilience: the trans-disciplinary convergence of conclusions concerning the same questions. When a variety of sciences observing the same phenomenon consistently reach compatible or similar conclusions on said phenomenon, this indicates that their independent methods and discoveries are essentially valid. This kind of intellectual coherence helps establish the soundness of various disciplinary "silos" approaches. It provides a counter-force to disciplinary fragmentation.

Critical natural capital: forms of natural capital, flora and fauna that can't be replaced by any form of human capital, for instance climate stability, the ozone layer, the photosynthesis and the water cycle that form the basis of complex life, as well as many plants and animals.

Decoupling (aka delinking): "decoupling" and "delinking" mean that a sustainable economy must separate (de-couple, de-link) the volume of inputs (the raw materials and energy used to create economic value) and outputs (the waste and pollution that result from the industrial process and value creation) from economic productivity (or value yield).

Ecological debt: as humans over-use natural resources and over-tax natural sinks, they run an ecological debt, a deficit that they manage to avoid paying through various strategies.

Ecological footprint: the sum total of our resource use and natural sink use.

Ecological modernization (weak version): the trust in the capacity of science and technology to address our environmental issues without structural changes to politics, society, power distribution, and dominant cultural practices. The strong version of ecological modernization couples scientific changes with structural changes, but is very much a minority position within the wider strand of ecological modernization.

Economics imperialism: the practice of applying the tools and concepts created by neo-classical economics to (apparently) non-economic activities such as public health, crime, dating and mating patterns, etc.

Feedback loop (positive): the amplification of the input energy (or message) by a system, the amplified response of a system to stimuli and input. Here, “positive” does not mean good or beneficial, it means an “amplified” (systemic) response. A “negative” feedback loop does not mean bad or detrimental, but a diminished (systemic) response.

Full-cost accounting: an integrated system of accounting that explicitly factors in environmental and social externalities. It is integrated because it attempts to translate into accounting norms the triple bottom line (profit, planet, and people).

Input/Output: the input (goods, energy, and commodities) that humans sink into the economy and the resulting output (value-creation in accounting terms, but also physical waste, pollution and degradation of natural conditions).

Overshoot day: marks the point at which, according to standardized calculations by the Global Footprint Network (the main authority on the subject), we exceed our annual quota of resources and reserves and start living on borrowed resources, mortgaging our future resources and transferring our excesses on vulnerable countries and communities by pillaging their resources and out-sourcing our pollution.

Ratchet effect: the process or dynamics that translates into the point of no-return, the procedures that cause a system to be unable to return to its previous state.

Sinks (natural sinks): the natural systems that absorb (or not) natural and anthropogenic waste and pollution (oceans, forests, and atmosphere). Their carrying capacity help determine the earth’s carrying capacity.

Steady-state economy (SSE): the goal, the ideal economic situation for ecological economics.

Techno-optimism (aka technoptimism): the trust in the capacity of science and technology to solve our environmental problems while maintaining economic growth.

Threshold (or critical threshold): the point at which a system tips, moves, evolves from state A to state B.

Throughput: the sum total of input and output through a system. In the economic system, the material throughput means the input (goods, commodities and energy) plus the output (the production of industrial waste and pollution).

Veblen goods: statutory goods purchased and displayed for social ostentation and conspicuous consumption, for instance luxury automobiles, latest gadgets and trendy artifacts.

Further reading

Organizations and Journals

- The International Society for Ecological Economics, publishes *Ecological Economics*
- United States Society for Ecological Economics, publishes *Reviews in Ecological Economics*
- Canadian Society for Ecological Economics
- European Society for Ecological Economics

Think Tanks for Ecological Economics

- Center for the Advancement of the Steady State Economy
- Global Development and Environment Institute (Tufts University)
- Gund Institute for Ecological Economics (University of Vermont, Burlington)
- The Beijer Institute for Ecological Economics (Stockholm, Sweden)
- Stockholm Resilience Center

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