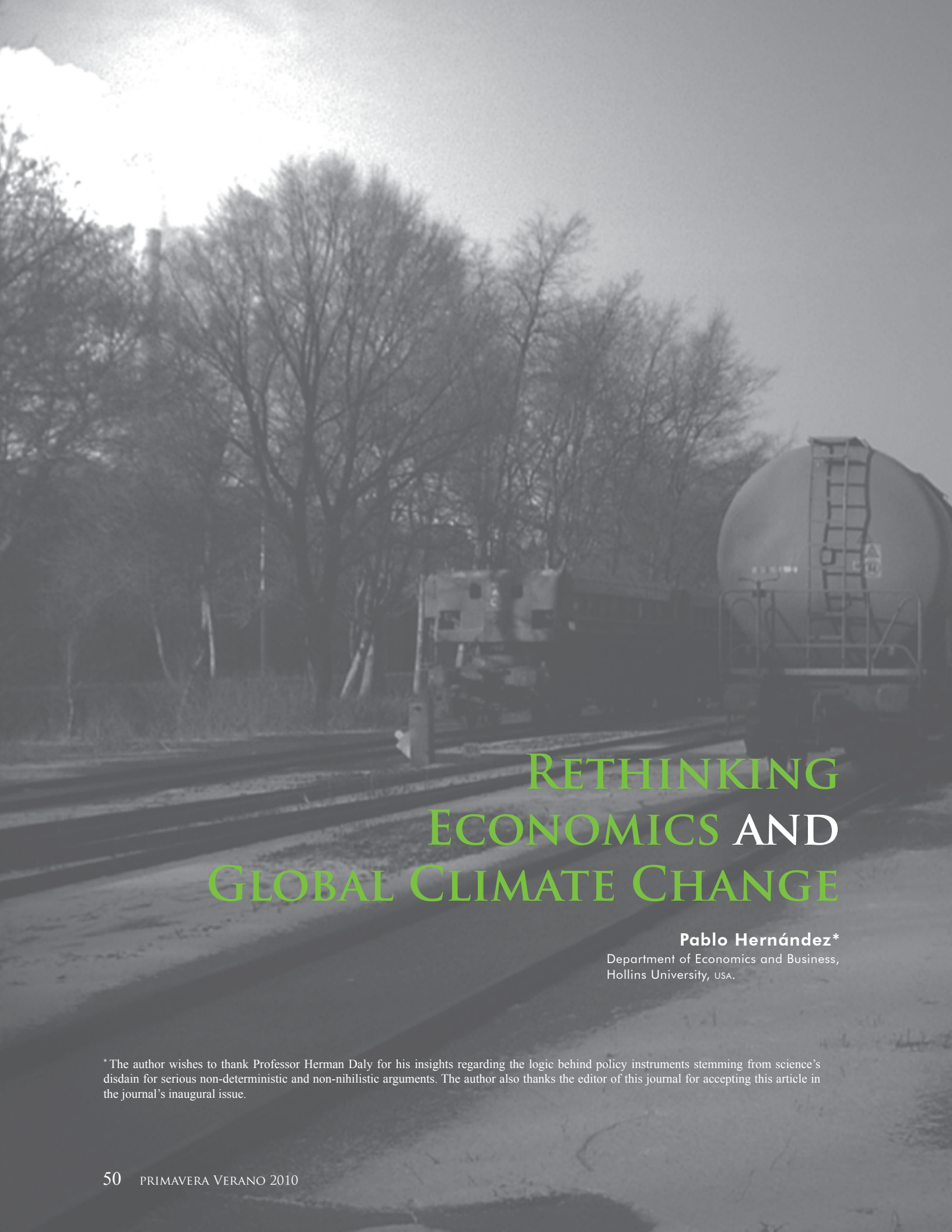
Rethinking Economics and Global Climate Change

Hernández, Pablo

2015-03-20



Rethinking Economics and Global Climate Change

Pablo Hernández*
Department of Economics and Business,
Hollins University, USA.

* The author wishes to thank Professor Herman Daly for his insights regarding the logic behind policy instruments stemming from science's disdain for serious non-deterministic and non-nihilistic arguments. The author also thanks the editor of this journal for accepting this article in the journal's inaugural issue.

Economics should continue strengthening the ongoing debate pertaining to global climate change, particularly, given the persistent scientific uncertainties in terms of the range and severity of potential outcomes that test the resilience of life on Earth. Part of the challenge on how economics may further inform or shape that debate stems from the type of discourses and disagreements surrounding climate destabilization, which often center on some die-hard presuppositions and deterministic evidence sought after by the hard sciences.[1] Given certain policy implications crafted on both sides of the scientifically-deterministic aisle, i.e.: hard and not-so-hard sciences, it may seem even harder to introduce serious non-deterministic and non-nihilistic attitudes into the climate destabilization debate.[2]

[1] The Economist. (2010) "Briefing the Science of Climate Change: The Clouds of Unknowing", March 20th- 26th, pp. 83 – 86

[2] It would be exceedingly ambitious and difficult to elaborate a comprehensive list of the latest and serious articles and books that address global climate change from numerous fields, amongst others: economics, environmental studies, ethics, journalism, politics, and philosophy. I shall list a few relatively recent pieces that have left deep impressions in my thoughts and interests: Daly, H. (1992) "Elements of Environmental Macroeconomics", chapter 3 in R. Costanza, ed., *Ecological Economics: The Science and Management of Sustainability*. New York, NY: Columbia University Press; Daly, H. and J. Cobb (1989) For the Common Good. *Redirecting the Economy toward Community, the Environment, and a Sustainable Future*. Boston, MA: Beacon Press; Kolbert, E. (2009) *Field Notes from a Catastrophe: Man, Nature, and Climate Change*. New York, NY: Bloomsbury; Orr, D. (2009) *Down to the Wire: Confronting Climate Collapse*. New York, NY: Oxford University Press; Shiva, V. (2008) *Soil Not Oil: Environmental Justice in a Time of Crisis*. Cambridge, MA: South End Press.

Fotografía: Imageafter

So why should we try to understand global climate change from economic perspectives and how might alternative economic viewpoints help us to address the use of scarce resources from an ecologically-sustainable scale? Could alternative paradigms in economics lead us to value-laden, non-deterministic, and less individually-centered discussions intended to embrace actions to avoid the dire consequences stemming from unchecked economic growth, greenhouse gas emission accumulation and climate destabilization?

The purpose of this essay is twofold: First, to inform the reader of the need to reshape discursive landscapes amongst researchers, academicians and media pundits in ways that welcome and foster the interplay of social and cultural phenomena within biophysical constraints. Secondly, the essay is meant to insist that the economic process, which is inherent to understanding global climate change given the choices or necessities we encounter to carry out our lifestyles, has been narrowly addressed. Rather, we should at least start by reckoning two very distinct views that address the nature of scarce resources and the scarcity of natural capital, namely: the neoclassical approach to economics and the environment and the ecological-economic approach to environmental distress.

Economic analyses pertaining to global climate change ought to call into question human beings' share of greenhouse gas emissions and other cumulative pollutants. Arguably, human-induced pollutants of this nature have grown dramatically since the onset of the industrial era (Harris 2006, p. 405). Again and again, climatologists and environmental scientists alert society about the dangers of reaching and exceeding tipping points whereby the expected gains from policies geared to change or reverse the trends may be offset by the expected losses arising from the social and ecological consequences of climate destabilization itself.[3]

This essay concludes by underscoring the need to (a) consciously differentiate between "needs" and "economic wants", and (b) think and act as value-laden academicians and scientists. The author of this essay believes that well-informed academicians, scientists and the general public ought to aim beyond deterministic relationships and begin questioning the essence of many presuppositions that are often taken for granted behind models and theories. Challenging the premises underlying our economic theories makes sense if we are to seriously examine whether our current economic aspirations are at odds with our planet's carrying capacity.

It should be noted that this essay does not intend to address recent examples of efforts meant to combat climate destabilization, such as the latest international negotiations to craft a post-Kyoto international treaty aimed at stabilizing atmospheric concentrations stemming from the accumulation of greenhouse gas emissions (e.g., The Copenhagen Summit).

I. Introduction

Early manifestations of scientific inquiry on global climate change surfaced since the 1800s. In the early 1800s, Jean Baptiste Fourier pioneered that the earth's atmosphere acts as a global greenhouse glass, which allows the Sun's heat through but stops heat from escaping the Earth's atmosphere. Toward the late 1800s, the Swedish scientist Svante Arrhenius posited that a human-induced greenhouse effect could occur on a global scale. Arrhenius conjectured that current trends of coal burning partly obeying the increased demand for energy, as a consequence of the process of industrialization, would lead to increased concentrations of carbon dioxide in the atmosphere, hence, causing temperatures on the Earth's surface to rise.[4]

[3] See, amongst others, Orr, D. (2009) *Down to the Wire: Confronting Climate Collapse*. New York, NY: Oxford University Press; and Hansen, J. (2009) *Storms of My Grandchildren: The Truth About the Coming Climate Catastrophe and Our Last Chance to Save Humanity*. New York, NY: Bloomsbury.

[4] Refer to Cline, W. R. (2004) "Climate Change", chapter 1 in B. Lomborg, ed., *Global Crises, Global Solutions*. Cambridge, UK: Cambridge University Press, and Fankhauser, S. (1995) Climate Change: *The*

Over time scientific analyses on global climate change have found that the production or use of practically all fossil fuels, including oil and natural gas, and human-processed chemicals, such as chlorofluorocarbons, methane and nitrous oxides, to mention a few, has lead to an unprecedented growth in the stock of cumulative pollutants trapped in the atmosphere.[5]

More recent scientific inquiries pertaining to human-induced global climate change have focused on a number of long-term patterns of climate destabilization given a set of premises, parameters and analytical tools, including: biophysical constraints, uncertainty, irreversibility and the complex modeling of ecosystem resilience and adaptability to sudden perturbations and feedback loops from nonlinear systems perspectives (Orr, 2009, pp. 192-94).

What seems rather new in this debate, however, is the range of instruments policy makers wish to embrace in order to circumvent (at best) or insure society (as a precaution) against potential catastrophic phenomena should the effects of climate destabilization lead the Earth on paths that become less suitable for life. Yet, social and economic policy implications aimed at lessening the impact of continued increases in the stock of cumulative pollutants in the Earth's biosphere have had far less time to reconcile mounting facts and uncertainties associated with the going scientific evidence on global climate change. In spite of the increasing scientific rigor behind the latest studies linking greenhouse gas emissions and climate destabilization, the going discourses often reflect an acquiescent support for further deterministic and nihilistic analyses whereby corollary policy responses are summoned to action. Although there are numerous conflicting views on the predictions climate scientists offer in terms of the range and extent of potential climate-destabilizing outcomes the opportunity to reexamine some scientific presuppositions in light of volition for non-deterministic and non-nihilistic values is long overdue.[6]

Volition is ubiquitous throughout the economic process. Economics is concerned with how societies choose to use scarce resources amongst competing ends.[7] For the most part, Neoclassical Economics or Mainstream Economics embraces the idea of markets and the mechanism of the price as the cornerstone for an efficient allocation of resources. Neoclassical economics focuses on aggregate individual volition across markets as a catalyst for its consequentialist ethical basis. Teleological or consequentialist ethical theories, such as ethical egoism and utilitarianism, "focus on the consequences of actions and the achievement of a desired end, such as utility maximization" (Anderson, 2004, pp. 87-101).

Deontological or non-consequentialist theories of rights, justice and virtue, on the other hand, focus on a sense of duty or obligation behind the decision.[8] Borrowing lopsidedly from economic classical liberalism, neoclassical economics blends individualism (ethical egoism) with utilitarianism to see in selfishness the act that sanctions social wellbeing. From this point of view, and to the extent volition is driven by incentives determined by consequences of actions, e.g., focusing on expected outcomes rather than virtue, individuals may pay far greater concern for human-imposed constraints rather than constraints arising from nature (i.e.: biophysical constraints). By invoking rational, individualistic, value-free deterministic approaches to scarcity and efficiency, neoclassical economics calls for greater doses of determinism meshed with the aggregation of individual choices to craft policy instruments most suitable to improve upon inefficient market outcomes. Lo-and-behold, neoclassical economics reiterates premises and deterministic outcomes in check with markets and price signals so policies come to the rescue should markets fail to deliver efficient allocations of "valuable commodities" and resources.

Yet not all economists would agree with this type of volition and methodological individualism espoused by neoclassical economics. Not only has this neoclassical view distanced itself from the problem of distribution (which was so critical to classical political economists), but it also fails to address volition facing the scale of economic activity relative to the ecosystem in which it is contained. To resist acquiescence with solely deterministic outcomes and consequential ethics, non-neoclassical economists have begun to assert the need to reexamine economics from its basic premises.[9]

Section two outlines the basic views on how neoclassical economics treats nature versus the ways in which ecological

Economics of the Greenhouse. London, UK: Earthscan.

[5] Harris, J. (2006) *Environmental and Natural Resources: A Contemporary Approach*. 2nd edition. Boston, MA: Houghton Mifflin Co.

[6] Two recent examples come to my mind. One deals with the conflicting scientific predictions on expected changes in surface temperatures across the Earth as reported by the latest Ipcc report, the IPCC Fourth Assessment Report "Climate Change 2007"; the 2006 Stern Review on the Economics of Climate Change (after N. Stern) regarding the effects of global warming; and the DICE global-warming model spearheaded by William Nordhaus (2007). Conceivably, there is a wealth of varying modeling techniques and premises behind these three assessments, and Nordhaus maintains that some prediction-discrepancies between the DICE and the Stern Review are due to differences in discounting. The second example, which draws from the predictions of the just mentioned assessments, comes from a recent issue of a newspaper: The Economist. (2010) "Briefing the Science of Climate Change: The Clouds of Unknowing", March 20th- 26th, pp. 83 – 86.

7 While acknowledging numerous and growing topics within the field, Samuelson, P.A. and Nordhaus, W. D. (2001, p. 4) offer the following fairly standard definition of economics: "Economics is the study of how societies use scarce resources to produce valuable commodities and distribute them among different people."

8 A superb analysis that teases out non-consequentialist ethics vis-à-vis the "virtues" of markets is found in Kanbur, R. (2004) "On Obnoxious Markets", in Cullenberg, S. and P. Pattanaik, eds., *Globalization, Culture and the Limits of the Market: Essays in Economics and Philosophy*. New York, NY: Oxford University Press.

9 Refer to Daly, H. (1992) "Elements of Environmental Macroeconomics", chapter 3 in R. Costanza, ed., Ecological Economics: The Science and Management of Sustainability. New York, NY: Columbia University Press; and Kanbur, R. (2004) "On Obnoxious Markets", in Cullenberg, S. and P. Pattanaik, eds., *Globalization, Culture and the Limits of the Market: Essays in Economics and Philosophy*. New York, NY: Oxford University Press.

economics approaches nature's household. Section three offers a comparison between neoclassical economics and ecological economics on how they approach global climate change. Finally, section four offers some concluding remarks.

II. Two opposing views

In classes, I have used the phrase "let's take environmental issues seriously" as a wakeup call to address environmental concerns from multidisciplinary views. The point is that truth lies outside the boundaries of any single discipline. In fact, many of our scientific presumptions and opinions often draw from insights, theories, and laws crafted and/or harnessed by a multitude of disciplines. After all, concerns over environmental distress often arise through the interplay between attitudes, volitions and the source and sink roles played by nature. Like other scientists, economists approach this interplay through various standard and not-so-standard paradigms, two of which have become known as environmental economics and ecological economics.

Nature's Household and the Economizing Problem: Constraints and Choices according to Environmental Economics

Environmental economics stems from neoclassical or standard economic analysis, which seeks an optimal allocation of resources via the marginal productivity distribution of income.[10] From its neoclassical foundations, environmental economics invokes the use of incentives, especially market incentives, to correct private outcomes in the presence of externalities (e.g., third party non-consented effects that may arise because of the overuse of a resource or good). Environmental economics assumes that there is some degree of substitutability between natural capital and physical (human-made) capital, such as buildings, roads, entrepreneurial talent, while treating the market economy as a closed system in which nothing comes either in or out. From this perspective, there is hardly any need to worry about biophysical constraints, particularly, entropy or the dissipation of efficiency matter-energy. In a closed system, energy is only transformed (1st law of thermodynamics). The implication of this is that resources, goods and services can supposedly flow from households to business and vice versa perpetually. In case markets do not live up to their expectations, that is, deliver the most efficient allocation of resources, policy instruments are invoked to (a) grease the wheels of this perpetual-motion of goods/resources, and (b) correct any externalities and distribution of income problems that may emerge along the way. Popular environmental economic techniques for assessing externalities and the valuation of resources or the amenities resources directly or indirectly provide, include: Cost-benefit analyses, contingent valuation as in survey methods to determine willingness to pay to enjoy an amenity or accept a charge for enjoying (using) a resource, hedonic pricing, and the estimation of empirical production functions (Harris 2006, pp. 106-114).

[10] In his *Principles of Political Economy and Taxation*, classical political economist David Ricardo developed formally the marginal productivity distribution of income, which posits that income is distributed across different members of society according to their marginal contribution to output.

Reexamining Constraints and Choices: Closed versus Open Systems, Natural Capital and Ecological Economics

Ecological economics is fairly young compared to its rather obtrusive neoclassical sibling. Ecological economics redirects contemporary economics to classical political economy on the basis of its views regarding energy inputs and limits to output and entrepreneurial will in the wake of diminishing marginal productivity of labor coupled with land of poorer quality.[11] Ecological economics is also heavily influenced by Kenneth Boulding's ideas regarding open versus closed systems, and Nicholas Georgescu-Roegen's and Herman Daly's imperative contributions on formally strapping the economic process by its biophysical constraints, particularly, underscoring the second law of thermodynamics, entropy, in the economic process. Ecological economics departs from classical political economy and neoclassical economics from its interpretation of the economic system or circular flow of the economy as an open subsystem within a larger albeit closed, finite, and non-growing ecosystem.[12] From this perspective, the only energy flowing into the ecosystem is provided by our nearest star, the sun, which grants us with the photosynthesis process. Energy flowing out of the ecosystem is by-product waste and heat. An economic system that grows within a closed, finite and non-growing ecosystem is bound to increase its share of net photosynthetic product.[13] In spite of characterizing the economy as an open system, ecological economists argue that the interaction between resources to produce commodities (goods and services) and by-product waste can lead to losses in energy efficiency (rising entropy) given a diminishing resilience of the ecosystem to perform its functions both as source of resources and a sink for our by-product waste.

[11] This was initially expounded by D. Ricardo's in his theory of rent and accumulation. A superb summary of this theory is found in Foley, D. (2006) *Adam's Fallacy: A Guide to Economic Theology*. Cambridge, MA: Belknap Press.

[12] Daly, H. (1996) *Beyond Growth: The Economics of Sustainable Development*. Boston, MA: Beacon Press.

[13] This is known as "ecological footprint" analysis

III. Economics and global climate change

From an economic angle, analyses on greenhouse gas emissions represent both environmental externalities (a fairly neoclassical economic concept) and the overexploitation of a common-property resource (Harris, 2006, p. 404). Environmental negative externalities are usually dealt with either through legislation, such as command-and-control decrees, or through the use of incentives, such as market incentives, or some combination of the two.[14] Market-based incentives, such as eco-taxes or subsidies for the development of more efficient techniques (e.g., innovation) or the adoption of less pollution-intensive technologies, have become more and more common. There are two major problems with the logic of market-based incentives. First, the valuation at market prices of the extent of the externality is a conceivably difficult (at best) if not and impossible process (at worst). Second, and to the extent reparations to third non-consented parties afflicted by the damages associated with the negative externality are accomplished (the best case scenario), it is hard to imagine how we might reengineer markets so incentives may be extended to compensate (or restore) any and all externality-driven disruptions that afflict biodiversity, ecosystem resilience and adaptability. In other words, the best thing that can happen according to the theory of environmental externalities is for species to be complacent with some "optimal level of pollution" (Harris, 2006, p. 49).

[14] Inherent in legislative action and market incentives the notion of the polluter pays principle or extended polluter responsibility in the case of a negative externality.

Fotografía: Imageafter

The overexploitation of a common or global-property resource, such as clean air, is also addressed within the economic sphere. Inherent in market analyses is the distinction between stock and flow variables. A country's Gross Domestic Product is an example of a flow variable and so is personal income or saving. Wealth, on the other hand, is classified as a stock because its value worth can be assessed at any given moment in time; whereas, changes in income matter over time. Units of goods or resources transacted in markets are measured in units per unit of time. So time is an intrinsic feature in market analyses.

Economists usually approach the welfare effect of pollution and environmental degradation by distinguishing between flow pollutants and stock or cumulative pollutants. The latter usually accumulate in air, water, and/or land surface over the very long run. So it is important to note that market-based incentives intended as reparations of societal damages caused by environmental negative externalities are somewhat meaningful when we are dealing with flow pollutants and less meaningful in the presence of stock pollutants. Because many of the pollutants classified under greenhouse gas emissions steadily accumulate over time it is crucial that we approach global goods or resources that are significantly affected by those greenhouse gas emissions in ways other than through market-based incentives. This is one reason why governments across countries have come together, through instances such as the United Nations, to create treaties to ban the production of chemicals or toxics that accumulate over time and across the globe. Under the Montreal Protocol, the banning of the production and use of chlorofluorocarbons and other substances that deplete the ozone layer is one recent example. Yet, international cooperation has also led to treaties attempting to limit or stabilize atmospheric concentrations of greenhouse gas emissions or retreating, at best, to earlier years' levels of greenhouse gas emissions. Ratified and sanctioned under the United Nations Framework Convention on Climate Change, the Kyoto Protocol is an international attempt to address such stabilization.

Overexploitation of a global-property resource is explained because of (a) the benefits of the resource accrue to everyone but since no single individual owns the resource, therefore, no single individual is willing to pay for it or care after it, and (b) an individual's use of the resource doesn't exclude other individuals from using it. In essence, the logic behind the overuse of global public goods obeys Hardin's "The Tragedy of the Commons".[15]

Common amongst mainstream economists is the use of game theory as an approach to try to avoid the overuse of global-property resources given the inherent incentive to free ride on such goods.[16] The international community benefits from limiting or stabilizing greenhouse gas emissions and, thus, diminishing the likelihood of catastrophic effects resulting from unchecked accumulation of greenhouse gas emissions. But, while these benefits are appropriated by all countries, the costs of constraining greenhouse gas emissions are borne by countries that undertake economic actions to limit such emissions.[17] The point is that this interdependence of country wellbeing opens the possibility of extending our use of policy instruments, such as strategic trade policies or sanctions, to reach second-best outcomes in the presence of market failures.

Another approach in dealing with stock pollutants is known as "tradable permits". The system of tradable permits is an alternative to a pollution tax. To the extent caps or limits on pollution emissions are credible and enforced, ecological economics is a bit more receptive to a cap-auction-trade arrangement involving tradable pollution permits once limits on emissions have been imposed and permits are dutifully auctioned to the highest bidder.

IV. Concluding remarks

It is important to note that economics has informed and should continue to inform the debate on global climate change. We've argued, however, that not all economics is based on the same premises or paradigms, and that the debate on global climate change has shown, thus far, very little receptiveness to non-deterministic and non-nihilistic ideas. Given that there are alternative views in economics, critical examinations and possible overhauls of some basic premises and ethical approaches from each perspective are long overdue. Finally, it is the author's view that the debate on global climate change could see major improvements if we questioned seriously whether our current economic aspirations are at odds with our planet's carrying capacity.

[15] Hardin, G. (1968) "The Tragedy of the Commons", *Science* 162, pp. 1243-48.

[16] Barrett, S. (1999) "The Credibility of Trade Sanctions in International Environmental Agreements", in Fredriksson, P., ed., *Trade, Global Policy and the Environment,* World Bank Discussion Paper No. 402, IBRD.

[17] Neoclassical literature has also dubbed this problem as "interdependent utility or profit maximization".

References

Anderson, D. (2004) *Environmental Economics and Natural Resource Management.* Mason, OH: Thomson South-Western.

Barrett, S. (1999) "The Credibility of Trade Sanctions in International Environmental Agreements", in Fredriksson, P., ed., *Trade, Global Policy and the Environment,* World Bank Discussion Paper No. 402, IBRD.

Cline, W. R. (2004) "Climate Change", chapter 1 in B. Lomborg, ed., Global Crises, Global Solutions. Cambridge, UK : Cambridge University Press.

Daly, H. (1996) *Beyond Growth: The Economics of Sustainable Development.* Boston, MA: Beacon Press.

Daly, H. (1992) "Elements of Environmental Macroeconomics", chapter 3 in R. Costanza, ed., *Ecological Economics: The Science and Management of Sustainability.* New York, NY: Columbia University Press.

Daly, H. and J. Cobb (1989) *For the Common Good. Redirecting the Economy toward Community, the Environment, and a Sustainable Future*. Boston, MA: Beacon Press.

Fankhauser, S. (1995) *Climate Change: The Economics of the Greenhouse.* London, UK : Earthscan.

Foley, D. (2006) *Adam's Fallacy: A Guide to Economic Theology.* Cambridge, MA: Belknap Press.

Hansen, J. (2009) *Storms of My Grandchildren: The Truth About the Coming Climate Catastrophe and Our Last Chance to Save Humanity.* New York, NY: Bloomsbury.

Hardin, G. (1968) "The Tragedy of the Commons", Science 162, pp. 1243-48.

Harris, J. (2006) *Environmental and Natural Resources: A Contemporary Approach*. 2nd edition. Boston, MA: Houghton Mifflin Co.

Intergovernmental Panel on Climate Change, IPCC (2007) Fourth Assessment Report "Climate Change 2007" www.ipcc.ch/publications_and_data/publications_and_data_reports.htm#1 (accessed March 26, 2010).

Kanbur, R. (2004) "On Obnoxious Markets", in Cullenberg, S. and P. Pattanaik, eds., *Globalization, Culture and the Limits of the Market: Essays in Economics and Philosophy*. New York, NY: Oxford University Press.

Kolbert, E. (2009) *Field Notes from a Catastrophe: Man, Nature, and Climate Change*. New York, NY: Bloomsbury.

Nordhaus, W. (2007) "A Review of the Stern Review on the Economics of Climate Change", *Journal of Economic Literature*, vol. 45(3), pp. 686-702.

Orr, D. (2009) *Down to the Wire: Confronting Climate Collapse.* New York, NY: Oxford University Press.

Samuelson, P.A. and Nordhaus, W. D. (2001) *Economics*. 17th edition, New York, NY: McGraw-Hill Irwin.

Shiva, V. (2008) *Soil Not Oil: Environmental Justice in a Time of Crisis.* Cambridge, MA: South End Press.

Stern, N. (2007) *The Economics of Climate Change: The Stern Review*. Cambridge, UK: Cambridge University Press.

The Economist. (2010) "Briefing the Science of Climate Change: The Clouds of Unknowing", March 20th- 26th, pp. 83–86.