

Entropy, economics, environment and ethics

C. K. Raju

AlBukhary International University
05200 Alor Setar, Malaysia

Abstract

Any serious initiative to protect the environment must address the underlying issues concerning economics and ethics. This may be done using the concept of entropy. Entropy, though abstract, is a physical entity, and may be regarded as a measure of disorder¹ in a strict information-theoretic sense.²

Environmental degradation may be understood as increase of entropy or growth of disorder. Though such an increase of entropy seems inevitable (on the entropy “law” or “second law of thermodynamics”) and few processes are ideally reversible, our concern is with the *quantitative* issue of *rate of growth* of entropy, which relates to the rate of growth of the economy.

The relation of entropy to economics has been the subject of continuing investigation, most famously through the work of Georgescu-Roegen.³ A key point which emerges is this. We tend to think of environmental degradation as a by-product of economic activity. However, a quantitative analysis using entropy shows that entropy increase or waste is the *main* product of economic activity, and use-value is a by product.

As an example, consider a car, which is a common item of consumption, and responsible for many urban environmental problems. Cars run on an internal combustion engine, the efficiency of which is around 26% despite a century of claims of technological innovation to increase efficiency. Thus, the “residual” 74% is waste. (In fact, even 26% is too high a figure, which neglects other entrained sources of waste, such as the waste involved in extracting the oil.) Thus, a car *primarily* produces waste (or entropy increase) and not use value. As argued by Georgescu-Roegen, this is the case with *all* economic activity: *the primary product of economic activity is waste or entropy, and “use value” is a by product.*

However, capitalism is premised on a positive economic rate of growth, as reflected in the riskless bank rate of interest. Zero growth or negative growth (recession) can have catastrophic consequences for a capitalist economy, as we have witnessed in recent times. Thus, the inescapable conclusion is that *environmental degradation is a direct and inevitable consequence of capitalism.* Capitalism, obviously, is not the only way of doing economics: for example, (proper) Islamic economics does not allow any interest rate, therefore there is no such thing as a riskless rate of growth in it. Likewise, socialist economics works on different principle of “to each according to his needs, and from each according to his capacity”, so that unlimited growth is not systemically built into it.

1 C. K. Raju, “Thermodynamic time”, chp. 4 in *Time: Towards a Consistent Theory*, Kluwer Academic, Dordrecht, 1994. Also, “On Time: 4. Thermodynamic Time”, *Physics Education (India) time*, 9(1) (1992) pp. 44-62.

2 R. B. Ash, *Information Theory*, Wiley Interscience, New York, 1965.

3 N. Georgescu-Roegen, *The entropy law and the economic process*, Harvard University Press, Cambridge, 1971.

Be that as it may, a capitalist economy requires constant economic growth, and constant economic growth can only result in a constant growth of waste or entropy. This exponential growth is not sustainable (and is a real nightmare, unlike Malthus' moralistic preachings based on bad mathematics). Therefore, considerations of entropy show that it is futile to believe that the environment can somehow be protected without fundamentally challenging the principles of the capitalist economy.

This has also been commonly interpreted to mean only a zero growth rate is sustainable (or a negative growth rate for “developed” economies and a positive growth rate for “less developed” economies, to arrive at an overall zero rate of growth). However, merely proposing overall zero growth rates for sustainability is *not* enough. Capitalism *encourages* waste also on the consumption side, by promoting the “ethic” of maximising consumption. Though this “ethic” is widespread today, there is nothing “natural” about it: capitalism does not proceed like Kautilya or Adam Smith from a theory of human nature to a theory of the economy. Exactly to the contrary, it alters “human nature” to match economics. This manipulation and control of human behaviour is achieved, like the church, by modifying human values.⁴ A simple way to see this is to notice that this was not always the case. For long centuries the dominant ethic was the one of simplicity and a *minimization* of wants, from Buddhist bhikkus to philosophers and sufi-s to Mahatma Gandhi.

Can this ethic be brought back? I ask this question not from nostalgia for a lost past, but as a question acutely important for the survival of future generations. This is possible with the ethic of the harmony principle which I proposed some time back,⁵ and which I have recently clarified.⁶ On the harmony principle, creation of harmony (order, negentropy, syntropy) or minimisation of entropy increase is the ultimate ethic and goal of life. The harmony principle properly generalizes the common evolutionary ethics based on the “survival of the species”. That evolutionary ethic (found also among animals) involves, of course, reproduction of life, but also acquisition of status, territory, and its stratification, to minimize violent conflicts, and preserve life.⁷ This about sums up the life of most people.

The harmony principle not only explains *why* individuals want to survive (something we tend to take for granted) but generalizes this idea of “survival of the species” to “survival of all life in the cosmos”, and goes beyond that to the “increase of order or harmony in the cosmos”. (An increase of “order” means exactly a decrease of entropy.) Hence, the harmony principle is not just another normative ethic based on some narrow prejudices or politics. Rather, it is based on a fresh understanding of science, and especially the concept of time, so badly mangled by the church in particular,⁸ and Western philosophical thought in general, including capitalism which reduces time to money. As I argued long ago,⁹ all that is needed is a proper understanding of (facts and science concerning) time, which practically compels this ethic of harmony to be adopted.

4 C. K. Raju, “Time as money”, chp. 10 in *The Eleven Pictures of Time*, Sage, 2003.

5 C. K. Raju, “Revaluation of all values”, chp. 12 in *The Eleven Pictures of Time*, Sage, 2003.

6 C. K. Raju, “The harmony principle”, *Philosophy East and West* 63(4) (2013) pp. 586-604.
<http://ckraju.net/papers/Harmony-principle-pew.pdf>.

7 Konrad Lorenz, *On Aggression*, Methuen, London, 1964.

8 C. K. Raju, “The curse on 'cyclic' time”, chp. 2 in *The Eleven Pictures of Time*, Sage, 2003.

9 C. K. Raju, “Reconstruction of values: the role of science”. In: *Cultural Reorientation in Modern India*, ed. Indu Banga and Jaidev, IIAS, Shimla, 1996, pp. 369–392.