

## Philosophy of Ecological Economics

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### Abstract

The fact that we live in a world full of answers and very few questions, has allowed for certain disciplines -particularly economics- to construct their arguments and theories based on an imaginary world. From quantum physics we now know that the world is not as we thought it was. The world is not mechanic and not Cartesian, but organic and holistic. We are actually facing a perplexing reality.

"This new "reality" is not based on matter anymore (matter is not made of matter) but relates to a fundamental immaterial connectedness obeying non deterministic laws. Reality is not "reality" but potentiality, which establishes and intimate, non-separable, non-reducible, holistic relationship between everything. Man is an integral and inseparable part of this more general, all-embracing immaterial reality.<sup>1</sup>

These fundamental messages have not reached the teaching of economics which is still anchored in the mechanical worldview of the 19<sup>th</sup> century. In order to open the new space into which economics should adapt itself, the essay presents four visions that attempt to answer what are probably the most important questions: Why do we exist? and What is the purpose of life? The paper ends with considerations about "Economics and Life" and "Economics for Life". The conclusion is that drastic changes in the teaching and application of economics are fundamental for survival.

<sup>1</sup>Dürr H (2001) "The Crisis and Challenge of Globalization: Insights from Physics". Max Planck Institut für Physik, München.

**Keywords:** Life; Improbability; Collective suicide; Consciousness; Nature; Immaterial connectedness; Growth; Development; Ecosystems

### Highlights

1. Economics is to serve the people and not the people to serve the economy.
2. Our being is the product of an absolute improbability of being.
3. Our capacity to destroy the infinitely improbable has become a certainty.
4. Man is nature taking consciousness of herself.
5. The less likely can occur (in the future) more likely.

### Opening Remarks

We live in a world full of answers and very few questions. What is especially sad is the absence of transcendental questions. I shall therefore start with what I consider to be probably the most profound of all questions: "Why do we exist? What is the purpose of life?"

As a first possibility I will suggest that life is probably the result of Nature, which in order to achieve significance, needs to discover herself. Without Nature there would be no life, and without life the entire cosmos would be senseless. Today we have sufficient scientific evidences to support the assumption that such a mirror/image relation is not the product of chance.

### Four views of life

**One:** In relation to life, we know that a living cell is composed of some twenty amino acids that form a sort of compact chain which, in turn, depends on a great amount of enzymes, plus the constituent parts of proteins, DNA and RNA. Considering such an enormous amount of components, the probability for a unique combination to occur for the formation of one living cell over an evolutionary process of millions of years, is in Prigogine's words, "vanishingly small" (Prigogine, 1994)<sup>2</sup>. An important question arises: How improbable does an event, sequence or system have to be before the chance hypothesis can be reasonably eliminated? I will try to answer with a very simple example.

<sup>2</sup>Personal conversation with Ilya Prigogine in Venice, May 1994.

Let us assume that one of these chains is composed of 1.000 elements. We know that there is just one combination of those elements that makes a living cell possible. Now, if the chain adopts a new combination every second, the more than 14 billion years of the Universe would not be enough to complete all the possibilities. Concretely all the possible combinations of a series with  $n$  elements will be equal to  $n!$  ( $n$  factorial). So, if  $n$  is equal to 1.000, all possible combinations will be 1.000! which is an incommensurable number, beyond any computable capacity. And now, if we consider a complete living being, the magnitudes are simply unimaginable<sup>3</sup>.

The 14.500 million years of age of the Universe are equivalent to 10 to the power of 19 seconds, while the "vanishingly small" probability of just generating, at random, a functional sequence of aminoacids in proteins is estimated to be one in 10 to the power of 65. (It should be noted that according to estimates, there are 10 to the power of 65 atoms in our galaxy).<sup>4</sup>

Considering such incredible magnitudes, and remembering the Law of Chance of the great mathematician Emile Borel: "*The very improbable never occurs*"; we must reach an overwhelming conclusion. In fact, "*Our being is the product of an absolute improbability of being*". Or rephrasing the statement: "*Despite the fact that it is impossible to be, nevertheless we are*".

<sup>3</sup>For those who do not know the concept, a factorial number, for example 5! is  $1*2*3*4*5=120$ . It is not difficult to imagine the immensity of 1.000! In mathematics the largest computable factorial number is 199! From 200! on, all are infinity.

<sup>4</sup>Dembski W (1998) Design inference: elimination of chance through small probabilities, Cambridge University Press, UK.

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I must clarify, at this stage, that I do not attempt to open doors to creationist or intelligent design interpretations of life. How life occurred is not my concern here. I am only interested in its infinite improbability. The how, is an open discussion for others.

The fact that we have not apprehended the notion that, being a part of life, we are part of the only scientifically provable miracle- actually the greatest of all miracles- is something that should profoundly preoccupy us. Not only have we not grasped the idea, but taken life and all that goes along with it for granted, we act as if everything we destroy and everything we predate were mechanically reversibly. Economics is in many aspects a perfect example of such an absurd behavior. We can, no doubt, affirm that as a consequence of the presently dominant economic rationality, *our capacity to destroy the infinitely improbable has become a certainty*.

For this stage of our history, it is overwhelmingly evident that we require a new economic rationality. An ecological economics, as I like to call it, as a sensible alternative; because it puts economics at the service of life, and not, as has been the case so far, life at the service of economics.

**Two:** An interesting debate took place in 1995, between the distinguished astrophysicist Carl Sagan and the great master of biology Ernst Mayr. The topic was the possibility of intelligent life in other planets.<sup>5</sup>

Sagan pointed out that if there exist many planets similar to ours, it is perfectly possible that intelligence may emerge in some of them.

Mayr pointed out that unlike physics based on laws, biology is based on concepts. Hence, if there are no laws in biology the ground for its theories are concepts such as *natural selection, fight for existence, competition, bio population, adaptation, reproductive success, selection of the female, male domination, etc.* As a consequence, points out Mayr, a philosophy of physics based on natural laws is very different from a philosophy of biology based on concepts.<sup>6</sup>

Mayr adds that physicist tend to think that if life originated somewhere, it will also develop intelligence at some point. Biologists, on the other hand, are impressed by the improbability of such a development. One must be conscious that evolution never moves on a straight line towards an objective ("intelligence"), as is the case with a chemical process or a physical law. The lines of evolution are highly complex and are similar to the bifurcations of the branches of a tree.

After the origin of life, 3.800 million years ago, the earth showed solely *procarriots*; that is, simple cells without an organized nucleus. Due to a unique event, up to this day only partially explained, some 1.800 million years ago appeared a *eucariot* cell for the first time. That is a cell with an organized nucleus plus further characteristics that correspond to superior organisms. From the *eucariots* originated three multicellular types of organisms: fungi, plants and animals. However, of the billions of species of fungi and plants, not one was capable of producing intelligence. Mayr describes how the billions of branches of the tree of life generated lineages of species along 1.800 million years, pointing out that the brain of hominids generated less than 3 million years ago, and the cortex of *Homo Sapiens* only 300.000 years ago. Nothing demonstrates in a clearer manner the improbability of superior intelligence than the existence of billions of lineages that never managed to acquire it.

<sup>5</sup>In Google can be found the text of the debate, as well as many additional comments of other thinkers.

<sup>6</sup>See Google text of the debate.

As mentioned, Mayr, from the point of view of a biologist argued that it was highly improbable to find another case of superior intelligence. An additional argument was that intelligence is a lethal mutation. The most successful organisms are those who can mutate fast, like bacteria, or other species who have shown stability in a given ecological niche, like crabs. These species do very well and can survive environmental crises. Yet, going up the tree towards what we call intelligence, species are increasingly less successful. When we reach the stage of mammals we find a small number compared, for example, with insects. At the level of the first human beings (about 100.000 year ago) we see that the number is very small and very vulnerable.

Mayr's argument went further in the sense that to find intelligence elsewhere is as improbable as a much larger duration of ourselves as a species in this planet; mainly because we are a lethal mutation. In addition he mentioned something that is quite disturbing. "The average life span of a species, of the billions that have existed, is about 100.000 years. This is more or less as long as we exist". Could it happen, considering the increasing deterioration we are provoking on our planet, that the next generation may be the first one to decide whether it is going to be the last? A possible answer follows.

The reason to identify us as a lethal mutation is due to the fact that of all the billions of lineages and species that integrate the tree of life, from bacteria all the way up through plants, fungi and animals to humans, we are the only species with the capacity and the willingness to destroy the entire tree. This is certainly a mistake of Nature; and Nature- we suppose - never makes the same mistake twice. But I would add one additional aspect not considered by Mayr. The reason of our power and willingness to destroy is not the result of intelligence alone, but rather the result of intelligence plus manipulative capacity. Our hands and, in particular, the position of our thumb in relation to the other fingers (different from the hand of primates) makes fine manipulation possible. Without the type of hand we have all of our technological development would have been impossible. And why does this contribute to a lethal mutation? Because having the capacity to manipulate, we never adapt ourselves to an existing environment, but we transform it so that it adapts to our desires or purposes. Intelligence plus manipulative capacity is what makes us believe that we are above Nature and not an inseparable part of it [1].

Once again improbability is a main actor.

**Three:** In 1989 the Swedish scientist Karl-Henrik Robert wrote a paper about sustainability and distributed it among 50 of the most important scientists of his country, of different disciplines. The purpose was to organize a project to reach a consensus of the Swedish scientific community as to what are the fundamental problems that our life is provoking on us as a species and on our planet. The result gave origin to *The Natural Step*, which as an initiative has generated actions in over 60 countries. The essence of the consensus follows:<sup>7</sup>

"Thousands of millions of years ago the earth consisted of a messed-up stew of toxic inorganic compounds. The transformation of such a stew into the wealth of mineral deposits, breathable air, water, soils, forests, fish and animal life that made possible a habitat for the human species and its civilization to emerge; all that begun with the green cell of the plants. This admirable and formidable cell had the ability of capturing a surplus of solar energy (negative entropy) beyond its own needs for maintenance and growth. They utilized such ability

<sup>7</sup>The text was handed over to me personally by Karl-Henrik Robert in 1991. I suggest searching for "The Natural Step" in Google.

over billions of years, to create all the complex compounds on which life and its activities depend [2].”

“Humans remained in balance with the regenerative capacity of the green cells until about one hundred years ago. It was then that our technology allowed us to exercise control over concentrated forms of energy. That allowed us to expand our dominion over the ecological space with such velocity and force, that we begun to reverse the evolutionary process of the earth, transforming ordered matter into molecular trash at a much faster rate than what the remaining green cells were capable of reprocessing. *It is an act of collective suicide. Ironically we have chosen to call it development.*”

“In recent years our technology has become so advanced, that a great proportion of human wastes consists of toxic metals and non natural stable compounds that simply cannot in any way be processed by the green cells. *The rubbish will remain here forever as a monument to our technological mastery and to our biological ignorance. That we also call development.*”

As already mentioned above, this is an example of the fact that our capacity to destroy the infinitely improbable has become a certainty.

**Four:** The opening statement of this essay was that life is probably the result of Nature which, in order to achieve significance, needs to discover itself. Discovery is an act of consciousness. All that exists is the result of consciousness. We know from quantum physics that a given subatomic event occurs because of our observation. The observer and the observed are inseparable. Observation is an act of consciousness. Hence, consciousness creates reality. In this sense it has been my impression that Nature exists because we have consciousness of her. But not long ago I realized, after rediscovering the Philosophy of Nature of Schelling (1775-1854), that my belief was inaccurate. Some opening comments are in order.

For humans, Nature has always been around, but until two hundred years ago was never a main actor. If, for example, we go through the history of painting, we will realize that Nature was always the background of persons. It is only after the rise of Romanticism and Idealist Philosophy, which took place in the area of Leipzig, Weimar and Jena (East of Germany), that Nature becomes the main center of our attention. Landscape paintings are precisely the offspring of Romanticism (*Caspar David Friedrich 1774 -1840*), *John Constable 1776 - 1837*). But not only painting. The same occurs with poetry and literature in general (*Wolfgang Goethe 1749 - 1854*, *Friedrich Schiller 1759 - 1832*, *Hölderlin 1770 - 1843*, *Byron 1788 - 1824*, *Shelley 1792 - 1822*, *Keats 1795 - 1821*, etc.). Along similar lines my dear friend *Rafael Bernal (1915 - 1972)*, Mexican writer and historian, discovered something quite unbelievable in his historical research about the chroniclers of the American conquest. Not one of them ever makes a description of Nature or of a landscape. One must imagine people coming from a semi-desert like Castilla and Andalucía standing in front of the Chimborazo mountain or crossing the Amazon jungle without ever describing the landscape they are seeing. Their only topic is what they do and what they suffer, the people they encounter and with whom they fight, and what they achieve. Nature as such is irrelevant.<sup>8</sup>

It was Schelling who told me that truth was one gigantic step ahead of what I had imagined. He poses that Nature lacks consciousness; is unconscious, and hence has a metaphysical rank. The fact that Nature has no consciousness of herself, presupposes that where the Absolute Self manifests itself is not in human subjectivity but in Nature. It is

the objective processes of Nature, as an unconscious expression of the absolute that allows the overcoming of that unconsciousness through man. In fact he tells us in his *Philosophy of Nature* that: “*Man (humans) IS Nature taking consciousness of herself*” (Schelling, 1795)<sup>9</sup>. Hence, it is not that Nature exists because I have consciousness of her, but she exists because I am her consciousness. This is in my view one of the most profound statements ever made. And if it is true (and I am certain that it is true) we must inevitably conclude that everything we destroy or deplete is an act of collective suicide. The forest I destroy is not a forest that was there while I was here. That forest is part of me and I am part of her. We are all inseparable partners of a whole.

The gigantic question now is: How should we behave in order to preserve the immense improbability of the miracle of life?

## Economics and Life

About ninety years have passed since quantum physics has revealed that the world is not as we think it is. It is strange and disconcerting that such an important message has still not reached economics, which continues assuming an illusionary world as real.

Let us go through some revelations. The Universe is no longer a machine full of components, but an indivisible dynamic whole. The world is not Cartesian. The behavior of each part is determined by its relations with the whole. It is no longer the parts that determine the behavior of the whole, but it is the whole that determines the behavior of the parts. There are clear similarities between the structure of matter and the structure of the mind, because consciousness plays a crucial role in observation, and to a great degree determines the properties of the observed. The observer is not only necessary for the observation of the properties of an atomic phenomenon, but is necessary for those properties to arise. We can no longer talk about Nature without talking simultaneously about ourselves.

Strangely enough very few have become aware of the truly revolutionary dimension of the new insights which have dramatically changed the world view. We are facing a perplexing new reality.

In this respect, I quote the distinguished German Physicist Hans-Peter Dürr:

“This new Reality is not based on matter “anymore (‘matter is not made of matter’) but relates to a “*fundamental immaterial connectedness*”. (‘Reality is not “reality but potentiality’) obeying non-deterministic laws. “This potentiality, similar to “information”, establishes an “intimate, non-separable, non-reducible, holistic relationship “between everything. [...] The future is essentially open, not “strictly determined, allowing genuine creation. Predictability “and knowledge and science (conditioned on determinism “and reductionism) do not hold anymore in the strict scientific “sense but are basically limited (and not only due to our “ignorance). *Man is an integral and inseparable part of this “more general, all-embracing immaterial Reality.*”<sup>10</sup>

An essential aspect of the Universe is consciousness, and as long as we continue to exclude her. We are severely limiting our possibilities of understanding natural and social phenomena. The great paradox may be that because we are intelligent<sup>11</sup> we tend to overshadow consciousness.

<sup>9</sup>“Ideen zu einer Philosophie der Natur”, 1795. There are several editions.

<sup>10</sup>Hans-Peter Dürr, “The Crisis and Challenge of Globalization: Insights from Physics”. Manuscript, Max Planck Institute für Physik, Munich, 2001.

<sup>11</sup>Mayr’s lethal mutation!

<sup>8</sup>Information obtained from conversations with Rafael Bernal in 1968 in Perú.

In other words, while *ceasing to be conscious that we are conscious*, we have constructed the foundations of a possible collective suicide.

The preceding arguments imply, among other challenges, the urgent and inevitable need to substantially modify our economic visions and, above all, the teaching of traditional economics.

From an ontological perspective, neoclassical economics is anchored on a mechanic worldview in which systems are integrated by parts. Ecological economics, on the other hand, is anchored on an organic worldview, where systems are not composed by parts, but by participants, all interrelated and inseparable. The result is that epistemologically ecological economics cannot be understood utilizing mono disciplinary perspectives like in neoclassical economics. In order to understand the interrelationship between economics, Nature and society we need transdisciplinary organic perspectives which, in addition, combine reason with intuition, the material with the spiritual, and ethics with aesthetics and beauty with truth.

The mechanical worldview supposes that physical matter is reality. Hence, mechanical explanations describe biological and social events as patterns of non-biological occurrence.

We forget that the mechanical worldview of neoclassicism is an abstraction, and what is worse is that we believe that abstraction to be the concrete reality. When consciousness, emotions and values are absent, we overshadow the connectivity between economics, society and living Nature. The organic worldview is characterized by non-linear interconnections between living entities, which means that the individual and the communal construct themselves and require each other at the same time.

According to the ontology of ecological economics, the organic world is based on a concept of Nature and society as collective phenomena, and not as the sum of individual atoms. Nothing in Nature can be what it is, except as an integral and integrated part of a dynamic whole.

In the mechanic world we pose problems and solutions as separated entities. In the organic world such entities don't exist. What we have instead is transformations and adaptations. Again, in the mechanic vision (still dominated by 19<sup>th</sup> century thinking) we tend to believe that a natural law is that: *"the more likely will occur (in the future) more likely"*. This fits the logic of the "realist". However, for the evolution of the living – which is the concern of this essay – we find on the contrary that, in the words of H. P. Dürr, *"the less likely can occur (in the future) more likely"*.<sup>12</sup> The best example, as has been expressed along this text is the evolution of the extremely improbable arrangements forming life, in only three-and-a-half billion years time.

Again, in the mechanic world of conventional economics, the optimal chance for survival in the long run is achieved through fixed goals that select the best options and the highest efficiency to reach it. In the organic world *the optimum is attained through "highest flexibility"* which means the possibility to adequately adapt to whatever conditions may arise in the future. In addition, to promote and respect the diversity of people and of cultures is fundamental for the quality of the whole.

As a conclusion, (Ingebrigsteen and Jakobsen)<sup>13</sup> "ecological economics requires a change from economic man to ecological man, from quantitative growth to qualitative development, from

<sup>12</sup>Dürr, op. cit.

<sup>13</sup>Stig I, Ove J (2012) Utopias and realism in ecological economics Ecological Economics 84: 84-90.

administration from the top down, to initiatives from down to top, from competition to cooperation, from structures of globalized power to local power of circular networks".

## Economics for Life

Although neoliberalism is today the dominant economic model in the world, those who consider that an alternative is urgently required, should not aim at the creation of another global model. What is required is diversity. That is, economic systems coherent with local and regional realities, with local and regional cultures, traditions, ways of living and worldviews. Diversity is good for strengthening living systems and for generating innovation and creativity, which are fundamental components of true development.

Assuming that a new world of diversity may emerge in the coming decades, each model should, at least respect some basic principles. In coherence with all the argumentations of this essay, I propose that all the diverse economies that may be designed, should fulfill five fundamental postulates and one inalienable value principle, regardless of their final style.

The postulates are Max-Neef [3]:

1. "The economy is to serve the people and not the people to serve the economy".
2. "Development is about people, and not about objects".
3. "Growth is not the same as development, and development does not necessarily require growth".
4. "No economy is possible in the absence of ecosystem services".
5. "The economy is a sub-system of a larger finite system – the biosphere – hence permanent growth is impossible".

The inalienable value principle is:

"No economic interest, under any circumstance, can be above the reverence for life".

If we follow the list it becomes absolutely evident that, one after the other, what we have today is exactly the opposite. Just a few examples should clarify the statement: 1) Today there are more slaves in the world than before the abolition of slavery in the nineteenth century. Quite a service for the economy!! 2) The production of colossal amounts of unnecessary consumer "bads" is a sign of progress. There appears the function of publicity: "induce you to buy what you don't need, with money that you don't have, in order to impress those who you don't know" (Calderón)<sup>14</sup>. Great for the protection on natural resources!! 3) All living systems grow up to a certain point where growth stops, but development continues. Growth is finite while development can go on forever. As Kenneth Boulding used to say: "those who believe that permanent growth is possible in a finite world are either mad or economists. 4) Just try to imagine what kind of economy could function without photosynthesis, without polinization, without the seasons, without the water, without thermodynamics, without all the other living species. Nothing of which appears in any economics textbook!! 5) The fact that something cannot be bigger than that, of which it is a part, is only too obvious. 6) The life of people has no value if there is oil under their feet. If Irak had been the world's greatest producer of radishes, and Libia the greatest producer of onions, Saddam Hussein and Muamar Gadafi would still be there!!

<sup>14</sup>A comment of Pablo Calderón Salazar in a Seminar in Brussels a few years ago.

## Coda

If from childhood on we were made aware of the true world in which we live, all could dramatically change for the better. To understand, with all its implications what it means to be part of an organic (non mechanic) world, would promote diversity of people and cultures as important assets for the success of the whole. Life, instead of a programme would be an adventure where permanent discoveries would turn us into complete beings.

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