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Exhausting the Natural Capital is a Dangerous Trend for the Sustainability of the Socio-Economic System

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Abstract: *Natural capital is the collective term both for the products of the natural assets of our planet and for the ecosystemic services that result from the interaction of these assets, services that support life on our planet. In fact, the ecosystemic services resulting from the activity of the Natural Capital constitute the fundament of the entire activity of the socio-economic system and include food, water, energy, climate security and other services essential for all. Unfortunately, often, the value of the natural capital was forgotten in the traditional methods used for measuring economic performance. This non-recognition of the importance of the natural capital has, in the end, a damaging effect on the ecosystems, biodiversity and natural environments in general and can trigger a loss of the essential services of the ecosystems. The value of the natural capital becomes acknowledged increasingly more as critical for economic success and economic sustainability. Many decision-makers and organizations have begun to focus on the way value can be attributed with precision to the natural capital and in connection to economic policies. The result hoped for is a better decision-making to manage, preserve and improve our natural environments. Moreover, the identification and quantification of the natural capital and of the ecosystemic goods and services offers a supplementary economic justification for the efficient management of the natural resources. As the scientific research has noticed and supports increasingly more, the attribution of value to the natural capital and to the ecosystemic services can be a positive step in the prevention of their exhaustion by promoting a better understanding of the true economic value of the ecosystemic services and by providing economic tools able to consider this value adequately.*

Keywords: *natural capital, ecosystem, biodiversity, hierarchic organization, economic sustainability, socio-economic system.*

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1. Introduction. The hierarchic organization of the environment

The environment is organized in systems, and among these systems there are specific hierarchic relations. This manner of understanding is the only way of perceiving and founding the development of the socio-economic system, as part and parcel of this organized hierarchy. Consequently, ecosystems are elementary structural and functional units of the organizational structure of the environment. Among the biotic and abiotic components, multiple direct and indirect relations are established, and the result of these relations consists in the structural and functional particularities of the components, but also of the system – elements determining a certain specificity of the matter and energy exchanges of the systems from different levels of organization, stating with the level of the ecosystems, continuing with the regional ecosystems groups, then the macro regional ecosystems groups and ending with the ecosphere. As one can see, the ecological systems' hierarchy integrates the biological systems' hierarchy, in such a way that any ecological system is composed of a biological system of supra-populational level and the abiotic set specific of the tridimensional space it occupies.

Due to the fact that these ecological systems, alone or organized in complexes, behave as dissipative structures, namely evolve in the sense of the increase of the organization degree (have an antientropic behavior), they become organized units constituting the carrier of life, have a specific dynamic on domains, yet tending to stability and harmony, generating the carrying capacity against the pressure of the command factors. At the same time, on the physical level, results the capacity of the ecosystems and ecosystems groups to gather and concentrate energy and to produce, in this way, renewable resources, namely the productive capacity. By their way of functioning, the ecological systems, namely the structural and functional units of the natural and anthropized physical, chemical and biological environment, have a key role in the dynamics of the climate system.

It is necessary to mention that all the categories of ecological systems are not just abstract and didactic constructions; they can be identified as physical and functional structures of the environment. Surely, the boundaries of an ecosystem or ecosystems group is not just a line, but zones of variable amplitudes marked by discontinuities [7].

2. The stability domains of the hierarchy

Under these circumstances, the hierarchic organization of the environment – fundament of the holistic/integrated approach suggests that

the stability domains of the ecosystems develop along trajectories having as principal attractor, the stability domains of the regional complexes of ecosystems, these in their turn develop and evolve in the basins of the stability domains specific of the macro regional ecosystems groups, and theirs, in the absorption basin of the stability domain of the ecosphere.

From here results, clearly, the hierarchic relation also between the stability domains of the ecological systems situated in the four hierarchic levels making up the ecological hierarchy (explanations on the Fig. Hierarchic organization of the environment). Ecological systems have the behaviour and particularities of the non-linear dynamic systems for which both the absorption basin and the attractor gets modified due to the cumulated influence of the command factors.

Their production of goods and services and their carrying capacity depend on the dynamics of their constitutive components and on their way of interacting.

Consequently, one can conclude that the stability domain of an ecological system is the attractor for the possible trajectories of the component sub-systems.

For this reason, from the new perspective, the dynamics of the non-linear systems is equivalent with the development process, and the distinction is clear between the two coupled stages of the development, on the one hand in the sense of the increase of the systems, represented by the ecological succession in the case of the natural and semi natural ecosystems and by the economic growth in the case of the socio-economic systems, and on the other hand in the sense of their evolution. In this sense, the actions of the commanding anthropic factor cannot ignore the need to increase the efficiency of the natural capital management and socio-economic system, starting from the following aspects:

• Development is a process supposing changes on the structural and functional level, common to all the ecological systems from the hierarchy called environment.

• The growth of the systems, characterized mainly by quantitative parameters, expressing productivity and/or complexity of products or resources, and also evolution, characterized mainly by qualitative parameters, such as: services diversity and quality, are obligatory stages of the development.

• Non-periodical fluctuations, namely the chaotical ones from the part of t e internal and especially external factors, determine a change in the development trajectory, after destabilizing the ecosystems.

• Given that socio-economic ecosystems have controlled dynamics, in continual transition, it results that a development under the pressure of

the market economy, of the human systems oriented exclusively to economic growth, becomes without perspective.

Consequently, those who design and manage on a national, regional or global scale, need to:

• reconsider the relation between economic growth and sustainable development,

• reconsider the present inequitable access to the resources of the natural capital and, consequently, counterbalance this determining factor, fuelling the real conflict between developing countries and developed countries and, especially,

• reconsider the so-difficult problem of recalibrating the coordinates of the market economy, focused on maximizing profit and find the solution to encompass the term development in the concept of 'sustainable socio-economic development', acting in this way also for the diminution of disparity and the realization of social peace [8, p. 228].

3. Productivity of the natural ecosystems

Essential is the fact that the ecological systems functioning in a natural regime have the capacity to produce the biological resources and to recycle the raw matter necessary for biological productivity, concentrating the solar energy in degrees. This complex process by which renewable resources and services (water and air quality, control of the atmosphere components and of the climate, etc.) are produced, namely the antientropic behaviour of the entire hierarchy of ecological systems is assured, is a very costly process from an energetic perspective, supported for free by the solar energy.

Natural capital is the collective term for these natural assets of the Earth and for the ecosystemic services resulting from them, which makes the human life possible [9].

Practically, the natural capital of a country, region or of the planet in general, is constituted of the network of ecological systems functioning in a natural and semi natural regime and of the network of anthropized systems, constructed by the transformation and simplification of the first two categories. For this reason, renewable natural resources, including water and soil and non-renewable on time scales on which the development assured by the natural capital components ought to be projected, constitute the key factor of the function of production of the economic system and the support of the so-called sustainable development. The entire economic activity of human communities including energy resources, climate stability, food, energy and water insurance is based on the exits from natural

ecosystems, since natural capital is often not attributed any value through traditional methods of assessing economic performance [9]. Not only the production of goods of natural ecosystems is traditionally ignored, but also their services which actually support life on the planet, and this lack of recognition for both products and services is not only a negligence, but it is a method by which aggression on nature is generally tolerated at the risk of losing basic life services on the planet. Here is a classification of the main services provided by natural ecosystems:

- The supply of goods for the direct benefit of human communities such as forest wood, ocean fish, pasture grass etc.
- Services of regulation, i.e. the array of functions accomplished by the ecosystems, generally attributed a monetary value on the conventional markets. These include climate regulation by carbon storage and control of local precipitations and flooding and drought attenuation.
- Tourism and cultural services which satisfy research, nature conservation and eco-tourism needs and which are generally accompanied by spiritual values.
- Climate services, pest control, atmosphere and hydrosphere purification, which are essential to the functioning of the planetary ecosystem.

Continuing this logic, the natural capital becomes part and parcel of the diversity of the ecological and biological systems and includes beside the components functioning in natural regime, the human species, together with their environment.

Natural capital has, consequently, a certain productive capacity which needs to be known by the managers of the economic activities, to avoid over-exploitation, namely a certain carrying capacity – essential parameter, necessary in the process of dimensioning the anthropic pressure, namely the human society, avoiding the degradation of the environment.

It results, as a logical consequence, that to guarantee a sustainable socioeconomic development it is absolutely necessary to assure the conservation of a diverse and balanced structure of the natural capital and the use of resources and services produced by it, within limits bearable for the components of the natural capital [8, p. 228].

4. Attributing a value to natural capital and ecosystemic services

On a national level it is also necessary to institute steps to consider the importance of the natural capital. The value of natural capital, the introduction into the system of accounts of both the intrinsic value of

natural capital (NC) and the value of its services, is a sine qua non condition for promoting the principles of sustainability and assessing the value of exits from natural ecosystems correctly. The change in the system of national accounts by adding green accounts highlighting environmental degradation and scarcity of resources in local and regional planning and development must concern all the word, starting with global and regional organizations and conferences, unions of States, NGOs, not least scientific research and education at all levels. It was not by chance that the earth summits raised issues such as environmental impact, conservation of biodiversity, conservation of habitats, ecological reconstruction and the importance of natural ecosystems for their production of goods and services [2].

It is regrettable that while recognizing the fundamental role of natural ecosystems in maintaining global balance, political decision-makers often continue to tolerate practices of overexploitation of natural resources, often motivated by accidents causing forest or grassland fires or economic projects to develop socio-economic systems, without counting the value of the resources and services of natural ecosystems and without counting the long-term interests of rural populations, the so-called ecosystem populations, interested, in the long term, in a proper management of natural environments. Often, unfortunately, locals who, by traditional practices, are able to ensure the conservation of natural resources, with all the advantages that result from this, are deprived of their land through so-called national and regional development programs that go beyond their legitimate interests in the sustainable management of components in natural environments. As a result, policy-makers, being forced to recognize the obvious degradation of the components of NC, have often been forced to take into account their value and importance, generated by the value of the products and services they provide. The best example is also that of the local communities which are dependent of the nature, those which have managed to show the real importance of goods and services for their stability and prosperity. This means that small, insignificant projects have actually been the starting points and opportunities for the proper exploitation of NC, which are possible because of the high level of awareness of these populations that act as part of natural ecosystems [10].

The importance of the natural capital becomes acknowledged more and more both on the global and on the national level. The risks associated to the destruction of the natural capital determine the decision factors and the institutions to evaluate its value and understand its importance when it comes to the provision of valuable ecosystemic services [10].

The UN Program for the Environment, suggesting the collaboration with the local communities and the use of their skills and knowledge, can be a vital component in the protection of the natural capital.

5. The problem of energy as a planetary emergency

We are living in a situation of global emergency. Make no mistake about it. As crises accompanied by climate change and biodiversity loss are getting worse, apocalyptic messages become more frequent. Yet, is our planet or are we all really doomed? The people of Global Footprint know it's not over, even if the emergency is obvious and manifests itself almost daily somewhere on the planet. This is an inappropriate practice because those dealing with emergency situations are trained and endowing with high costs and often these specialized groups solve emergencies, although these solutions are increasingly expensive.

Wouldn't be better and more appropriate to deal with the causes and not the effects of imbalances, when experts are almost unanimous in saying that emissions of particles matter, free carbon is producing global warming and all these threats are intensifying emergencies and making them both more expensive and more threatening for global balance? Paradoxically, although the world's wealth is increasingly vulnerable and its preservation is much more expensive, greenhouse gas emissions continue to increase, and a lot of meetings on environment and climate change, political decision-makers are invoking the right to pollute.

If the economic dimension of human activities is increasingly invoked and carbon-based resource holders undermine the fact that it is now cheaper to use energy from renewable sources than from fossil fuels, it is clear that before the environmental crisis we are experiencing is the moral crisis, ethical or liability crisis that can only be solved by instruction. While traditional agriculture, as well as ecological reconstruction of land damaged by overexploitation of natural resources, are obvious ways of getting things right, the political leadership is trapped in some economic interest groups that complain and trade the right to pollute.

If exceeding the regeneration rates and the obvious over-exploitation of basic resources means compromising the ability of future generations to meet their basic needs, it follows that the increasingly virulent movements and actions of young people against those who are blind to the obvious degradation of the planetary environment are quite justified and worthy of support. Young people will have to convince their parents and attract them to change their attitude so necessary if they are to stop the current way of doing business promoted by the holders of the large financial resources.

Solving the moral crisis is the most important opportunity for the economic slippages we are witnessing at, with direct consequences for the unbalancing of the ecosystem. If we look carefully at the fact that problems related to resource consumption and greenhouse gas emissions have arisen since the middle of the last century, and the Report of the Club in Rome (1972) gave a great warning concerning the need to promote renewable energy technologies, it is clear that this highly publicized change has not occurred, because they have primed the interests of those who invented the term "sustainable development" simply as a response to the suggestive report named "Limits of Growth". It was natural for most people to believe that the early solar age of human civilization, based on the constant, benevolent and free energy of the sun, would be resumed on another scale [6].

Oil, gas and coal still yield most of the energy worldwide yet burning these fossil fuels releases gaseous carbon dioxide changing the atmospheric heat flow and ultimately the Earth's climate.

More and more scientists believe that if the fossil fuels burning rate continues to grow, these climate changes could disturb the agriculture and trigger famines in our lifetime. Climatologists assumed a massive and increasingly significant use of fossil fuels, as most energy planners saw it necessary. The choice was between unpredictable climate change, costs and risks of nuclear energy or lack of energy and continued poverty in the third world. It is simply not true that global prosperity and equity require an increasing use of fossil or nuclear fuels. Newly developed technologies can provide the same energy services cheaper, extracting more work from our energy and harnessing the renewable solar, wind, water and biomass energy flows. This energy strategy at the lowest cost, namely that aiming to meet the societal needs at the lowest possible economic cost, as on a free competitive market, would make the burning of fossil fuels, which threatens the world's climate, truly unnecessary and non-economical.

The renewable energy segment has consolidated itself rapidly over the last 20 years, especially in terms of electricity generation, gaining a larger market share compared to traditional energy sources such as coal, oil and nuclear energy. The COVID-19 crisis had a significant impact on this segment of the energy sector, as the pandemic disrupted supply chains and labor force availability. Access to funding has also been seriously affected. These recent trends have influenced already approved projects, and ongoing projects.

Other sectors are expected to use renewable energy increasingly more, especially the chemical or metal sectors, whose activities make them major polluters having to comply with stricter regulations. These sectors must also adapt to the public's vehement attitude to pollution and to the possibility of increasing number of lawsuits [3].

However, since the beginning of the 21st century, renewable energy gained representativeness in the global electricity matrix. According to figures from the International Renewable Energy Agency (IRENA), renewable resources gained momentum in recent years, rising from 21.8% of the total installed global electricity capacity in 2000 to 34.7% in 2019, mainly due to the growing global consensus that an economy based on carbon is unsustainable. This is supported by the direct link between the consumption of energy produced by burning fossil fuels and climate changes. In addition, the availability and the reserves of fossil fuels are limited and therefore price volatility may add to market uncertainties. Also remarkable is the changing weight in the use of renewable energy sources, namely while in 2000 hydropower accounted for 93% of the total global renewable energy production capacities, this ratio fell fast, reaching 47% in 2019, as other sources, especially solar and wind ones, gained representativeness in the global matrix.

According to the International Energy Agency estimates, global CO2 emissions are expected to fall by 2020, by about 8% compared to the previous year, a trend in the level of emissions since a decade ago [5].

Anyway, new investments and tenders in renewable energy projects worldwide, though postponed until 2021, will be unstoppable because even the energy agency estimates that renewable energy sources will be the only power source growing every year in the future.

6. Man's attitude to nature has changed

The scientific exploration of the surrounding nature yielded, especially in recent years, notable results, relating to the specificity of the living world, such as explicit communication capabilities of plant kingdom components, insect communities organization formations, events of intelligent behavior in many species of the animal and fish classes. It is at least paradoxical that, owing to the unprecedented development of scientific research at this beginning of the century and millennium, sensational revelations in relation to the living world and its natural environment have been possible, at the same time, at the end and beginning of the era, there are also the most violent forms of aggression on environmental components, with devastating results such as the narrowing of biodiversity, global warming, resource depletion and habitat degradation.

It is not by chance that all this shows that regrettably, the accumulation of information due to scientific knowledge, present in the philosophical and spiritual reflection, does not inevitably lead to a wiser life, but, seemingly, leads to the contrary.

One can even observe, turning to behavioral sciences, that an increasingly present connection between the disorder of nature and the inner disorder of man is highlighted. This interpretive approach, not only offers a real possibility to promote the results of scientific research in terms of the existence of human communities, but it is also expected that these links between environmental knowledge in general and natural ecosystems in particular, psychology and studies of behavior and manifestations of the mind could be a suitable place for rediscovering an adequate relationship of man with nature.

We have shown above that the Universe in which we live is characterized by admirable physics and is evident and almost unanimously accepted that, by comparison with the multitude of types of universe that could have been born from the initial explosion, this universe of ours, possesses physical characteristics surprisingly suitable for the existence of life. And if we talk about our galaxy, as well as the Sun they are very good for the planet's biosphere, not only because our sun is suitable as size and solar activity that generates a living on our planet, but also its location protects the earth's environment from the great galactic accidents.

Such observations, which are direct results of scientific research, raise some important considerations for which life and the populations that form our planet's biodiversity are worthy of being defended. In other words, it would be inceptive not to recognize that the best-performing components of the history of human civilization on this planet are directly due to nature, biodiversity and the natural environment in general, and that in the course of history any attempt by man to break away from nature has proved to be inappropriate [4].

Extremely many pieces of scientific evidence and arguments highlight the unique value of nature for the human life and the progress of civilization in general, although today many aspects of the living world not only seem insignificant, if not harmful, but more often than not they are not even studied. In fact, only science shows that they are precious, and they can be used in various ways, being vital, useful, or simply, often, amazing.

7. Conclusions

It is clear that scientific research has the merit of being promoted at this end and the beginning of the century and millennium, an unsuspected dimension of the environment, based on the holistic, integrated approach. This approach has allowed the planet to no longer be considered only a reservoir of resources to support the communities that are populating it, which are in an increasing economic competition.

In the light of the new approach, the environment is becoming a functional hierarchy, based on ecosystems, simple or organized in ever larger, more stable and better organized complexes. In such spaces, nature with its legacies breathes as a spiritual entity in which the whole creation was put to the service of humans.

Although civilizations were built on the basis of extracted resources and often removed from natural environments, with their extravagant infrastructure, it seemed more than ever that the primate behavior of the so-called civilized world threatened the workings of the planet's environment as an organized hierarchy and even the life of the world.

It is not by chance that scientific research is called upon to answer questions about how to restore connection with nature, to preserve and maintain nature, to correct the attitude of human communities.

In a remarkable convergence, the sciences' recent discoveries and Christian spirituality recommend a certain detachment from the consumerist society's sensory overstimulation and the avoidance of the fragmentation of attention, for a life lived more judiciously. It is a life similar to an ascetic conduct, which aims at a renewal of our feeling and understanding, of our life as a whole. By freeing himself from the captivity of the senses, man can also free nature from the chains of his over-exploitation, from the grip of his reckless uses, springing from the aberrant desires that feed this pandemic of consumerism.

So, one can say that only in the experience of faith, by cultivating the spiritual life, can we establish an adequate relationship with nature, a relationship at the same time edifying for man and sustainable for nature and civilization [1, 4].

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