ECONOMY AND ECOLOGY – 21st century CHALLENGE

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Abstract

In this paper, based on the specialised research and their own opinions, the authors try to find an equilibrium, a reconciliation of man with nature so that the future of following generations will not be threatened, although the global statement is for this to happen. The approach begins with the semantics of the title, approaching separately both components and also with the fact that, etymologically, economy and ecology are related, having the same purpose, the management of material and human resources, but in a different manner. In the introduction, we are presenting the relationship between man and the environment, from the emergence of the human species on Earth to this day. At the beginning of its existence, by providing the existential needs, man has not brought major damages to nature.Not the same can be said once the industrial revolution began and especially with the new technical-scientific revolution, in short, the modern science and technique, significantly increasing man's power, have, on average, raised the living standards everywhere, consuming ever more resources.

The next aspect is that of ecology, as a new science emerging out of rational reasons, aiming the protection of the environment and therefore of humans. Ecology can be characterised as a science of nature, with a relational character, a science of ecosphere, a universal science. In terms of time and reasoning, the following limitations of ecology can be mentioned: limitations due to some material factors, due to some spiritual factors, conceptual and existential limitations. In our opinion, ecology may show us the future of humanity in two ways: The first one shows us that we are not able to get over the greed and selfishness that defines us as people and beyond. We will get to the point of having an infected planet, new diseases will appear, which we will not be able to handle, we will hunger for some clean water, we will be dreaming about long ago disappeared fruit and vegetables, we will kill each other and fight in wars for the few fertile lands left and clean waters, we will face natural disasters etc. And in a sad end, we, the people, will self-exterminate, we will disappear as human beings and the land will of course regenerate and will start all over again without us. The second option shows a more optimistic future, in which humanity will face genuine survival problems, in which natural resources have been exhausted and the population will seriously decrease and a small number of intelligent people of those

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remaining will isolate themselves from the rest of the world and wait for the end of the crisis, when they will be the only ones left. From this moment on, they will come to light, they will start from zero, they will create a new world, a new chapter of humanity, one in which all is well-thought and planned, where there will not be mistakes, but only evolution, a world without money, without capitalism, politics, or leaders of any kind. It will be a world where research and the evolution of knowledge about everything is paramount, a world where the number of the population will be planned and controlled.

Economy, through the shocking realities, translated by the environmental crisis and the uncertainty of the future of humanity on Earth is called to reconcile man with nature through a different approach which exceeds the limited framework of monetary competitive economies based mainly on the principles of profit maximization and selfish individual interests, social order based on the principles of subsidiarity and solidarity. Economy must remain at a human level, it must humanise. As for solidarity as a principle of the economic life, this represents a reversal of the principle of capitalist competition. Solidarity requires collaboration, not competition, and its purpose is not profit, but the common good. An economy based on altruism and not on selfishness.

The last part is reserved for conclusions resulting from the approaches taken. Interrupting the economic growth is not the most rational solution since there are differences between countries in terms of economic, technological, scientific etc. development. The relationship between ecology and economy focuses mainly on 3 directions: The first one would be to specify the theoretical and methodological framework emerged from the mathematical model describing the relation between economic development and pollution, the second direction refers to the legal nature of the aspect and the last one takes into account issues related to the actual possibilities to recover and protect the environment (the development of eco-industry market).

1. INTRODUCTION

The environment and man are two words that do not fit in any aspect. The relationship issue between man and environment is not new. It appeared with the first human communities, because man, with his intelligent and creative spirit that define him, was not satisfied with nature as it were, but courageously and tenaciously started to change it according to his needs. Constantly multiplying, the human species added new aspects to the natural landscape, turning wetlands and fallow lands into fertile valleys, arid lands into green oasis; it created new varieties of crops and domesticated wild animals. So far, the natural balance has only suffered on very limited areas, which could not affect the whole.

The turning point intervened with the industrial revolution and, more especially with the new technical-scientific revolution, thanks to which airplanes and missiles are streaking the heavens today and piercing the clouds, increasingly larger and stronger ships cleave the seas and oceans, bursts of hydroelectric power stations turn water power into light, energy that fuels the

increasingly larger car fleet. In short, modern science and technology, immeasurably increasing human power, raised, on average, the living standards everywhere. But the reverse of industrial civilization, of material progress has been and is the deterioration of natural environment. Under the impact of economic development, the soil, water and air have been polluted, more or less seriously, various species of plants and animals have disappeared or are endangered and man, in his turn, is confronted with various diseases caused by pollution, a phenomenon which now includes all countries and continents. Its effects are felt even on the lands of, until soon immaculate, Antarctica. It was calculated that during a decade, the deviations of the civilization have caused more damages to the environment than an entire millennium.

Pollution, as a global issue, is the prerogative of our century, specifically of the last three decades, during which the world population grew from 5 to 7 billion people. Is this many or few? Does their number actually put a "demographic pressure" on the environment? Here are some questions that have already troubled the demographers, economists, doctors and other specialists, as well as politicians. The problem that specialists have in fact been concerned with is if enough food can be provided to the population, and only during recent decades they have focused on an aspect that proved to be equally important: degradation of the environment through pollution, erosion and other phenomena, caused by intentional or not action of the man, a process that affects not only the possibilities of purchasing food, but also other aspects of the human existence, starting with health.

There is no doubt that soil is the most precious capital that man has for satisfying his needs and ambitions. After all, at least until the invention of artificial photosynthesis, we all depend on the thin and fertile layer of the Earth's surface, from where all life resources are extracted. However, one of the great paradoxes is that man, out of ignorance, greed, negligence or other causes, tends to jeopardize the source of life. This is how, while modern technology allows him to introduce in the productive circuit millions of hectares of land that until yesterday were considered inert forever, other millions of hectares of productive lands are becoming inadequate for cultivation, because of human action, too.

Ever since man began to fight against nature, desert area increased by a billion hectares and the process is moving at an accelerated pace. It should be added that every year millions of hectares of productive soils are "devoured" by roads, factories and cities, as many sequences of the unequal duel between green and asphalt. Ever since the first primitive axe cut down the first tree, forests have lost half of their extent, while mankind has multiplied by hundreds or even thousands of times. Destruction of forests, to which stability and the quality of three fundamental elements of the human life is due – soil, air and water – has had over time disastrous effects. Forests play an important part in fixing the relatively thin layer of fertile soil, the germinating environment of the plant mass. Massive deforestation have buried under sand dunes flourishing civilisations, not only in Northern Africa, but also in Asia, and in some parts of Europe they have pushed the deforestation of mountains and hills to limits close to calamity.

2. ECOLOGY – THE SCIENCE OF THE ECONOMY OF NATURE, A SCIENCE OF THE FUTURE

Etymologically, ecology is related to another area of study - economics *[gr. oikonomikon* = management of material and human resources]. In other words, the material resources (raw materials, energy) and human resources (labour force, biological and social framework) are used to maintain the society's active production sources.

First of all, we should underline some features of ecology and answer the question if ecology is a science.

Ecology teaches man to understand and reflect on his relationships with the living world, the Universe and realize the benefits of its relationships with nature, the environment in the immediate neighbourhood (*oikos* in a narrow sense) (PEARSON 1989; KAREN 1989), with the inhabited part of the planet (*oikumen*) (TOYNBEE 1976), with the biosphere or ecosphere in all its unity, as a permanently living organism (LOVELOCK 1972; LOVELOCK and MARGULIS 1973, LOVELOCK 1995). Ecology is a science of ecosphere, a universal science.

All data collected in the field of ecology is in connection to the approach of the study of the relationships between a complex bio-system and the biotic and abiotic factors that the bio-system is facing in its living environment. Ecology is a science with a relational character.

Like other sciences, ecology has become a coherent system of knowledge on certain structures and natural phenomena, verifiable and repeatable observations over time (verified through logically performed experiments). It was born on the fertile and fabulous lands of biology. Ecology is a science of nature.

Through the presented characteristics, we may answer the question – Is ecology a science? Definitely – yes. And it is a very important one, with highly diversified theoretical and practical valences.

In order for a field of human thinking to be a science, especially a science of nature, it must have objective characteristics, specific features (MAHNER and BUNGE 1997). The 12 features described by the above mentioned authors define ecology as the independent science within the wide field of natural sciences (*it has an international community of scientists; specialists have ecological research projects; there is a database made over time, with reference to past, present and future changes; there is a formal, mathematical basis; a specific database and phenomena; there is a range on the issue; there are facts-data-theories on the knowledge of the Universe; there are research methods and procedures; ecology is a field characterised by interdisciplinarity-multidisciplinarity-interdisciplinarity; there is the basis of current knowledge*)

Like any other science, it has its limitations. In terms of time and thinking, ecology might have the following limitations:

a. *limitations due to material factors*. Scientific equipment, research and investigation methodology and technique are developed and modernised at a much slower pace than the needs of the society, which are growing exponentially.

b. *limitations due to spiritual factors*. Human attitudes change slowly. The structure and functionality of bio-systems increases greatly in complexity and the classical and even mathematical logic will not be able to keep up with this complexity.

c. *conceptual limitations*. Here, things are more complex. First, not everything that is discovered, even through a scientific method, is absolute, but it implies a certain degree of relativity. Therefore, any data, any definition, any hypothesis can be tested, shaped, improved.

d. *existential limitations*. These limitations are due to the material world we are living in.

Ecology drives economy towards change, the redefinition of theories that have long ignored the problems of the environment, as well as the relationship between ecological and economic crises. Ecology forces economy to restructure, rethink and create new management and administration methods of human society, at the national and regional level.

Ecology, so complicated and yet so simple, people are talking about it, but personally I believe we are not doing almost anything to preserve the environment, and when I say we are not doing anything, I am referring to all of us, inhabitants of the planet. We may say that: we are exactly what we are, neither more, nor less. We watch documentaries, read eco magazines, and most of the times this is what it all gets to. Yes, we admit there are ecological cities and wind plantations, and that research on environmental degradation is made, but this is very little in comparison to the magnitude of current pollution. In terms of the reality of the current development stage of mankind, we usually foresee the future of humanity only in two ways.

The first one would be that: we cannot get over the greed and selfishness that defines us as people and we will continue to use every opportunity to make money, although this means polluting as much as we can. We are ecologists until we get the chance to make profit and this is a no return road, namely the most of profits. I do not believe we are rational and intelligent beings as we like to believe, therefore we will continue to pollute, to neglect the planet's resources in order to live well today, we do not care what happens tomorrow and … the result will be an infected planet, new diseases that we cannot handle will appear, we will hunger for a little clean water, dream of long gone fruit and vegetables, we will kill and war against each other for the few remaining fertile lands and clean waters, natural disasters, etc., etc., you all know the consequences too well, there is no need for me to write them. And in a sad ending, we, THE PEOPLE, will self-exterminate ourselves, we will disappear as human beings and the earth will of course regenerate and will starts all over again, without us, and the chance for man to recreate as human species is excluded. This is our only chance for us to think more about our existence as humans, as beings and to do more for our survival.

The second possibility would be that, in the near future, when mankind will face genuine survival problems, when natural resources will have extinguished and the population will have dropped to nearly zero, a small number of intelligent people of those remaining will get isolated from the rest of the world and wait for the end of the crisis, start over, having knowledge of physics, chemistry, biology, mathematics, etc., people with high IQ as we call them today, they will reinvent themselves and create a new world, a new chapter for humanity, a chapter in which everything is well though out and planned, where no mistakes will exist, only evolution, a world

without money, without capitalism, politics, leaders of any kind. It will be a world where research and development of knowledge about everything will be crucial, a world in which the number of the population will be planned and controlled, where genetics will be well understood and modified, as well as the wonderful engineering of the natural ecosystem, new methods of self-gratification for important discoveries will exist.

Telepathy will develop, violence of any kind will be history, nothing will be random, the word WASTE will no exist as a word or a fact, it might seem like a sterile and boring world, but there will be the feeling of satisfaction and fulfilment to discover and understand as much as possible from all and everything; a technology so advanced that no one, absolutely no one will have to do physical work, but only mental, a humanity in which present and future will be understood better than ever, a world that we could not understand and accept today and that might seem strange. A world that will fully understand nature and will exceed it in complexity; it will for the first time in the history of mankind that man shakes hands with nature, the same way as engineering. We will become what we call today intelligent beings from other planets, tomorrow we will be today's aliens.

3. THE FUTURE OF ECONOMICS-SUSTAINABLE DEVELOPMENT

Economy, through the economic processes, has ensured the development of human society, satisfying its needs, necessities and even pleasures. It was all achieved through an increasingly higher consumption of resources, reaching, we might say, a critical stage. We are regarding this not in terms of the impossibility to meet human necessities, but in terms of the future of the human species, as a result of the primordial characteristic of resources, that of reality.

There is, at least at this stage and without a forecast for until when, a contradiction, an incompatibility between the optimum economic and the environmental optimum and this is in relation to the environmental support ability, respectively of the different ecosystems or of the so-called natural system. This contradiction, which we called fundamental, but which is most important in the current stage between environment (nature) and society (man) derives from:

- the structure and dynamics of resource consumption;
- the pollutant character (in varying degrees) of the productive system technologies;
- the local, regional and international policy.

Environment must not be considered only a supplier of resources and services, it has a *fundamental function for the society* – that of *preserving life* – the basis of all economic activity (fig. 3.1)

Through his economic activity, man has been in a permanent strong interaction with natural ecosystems, influencing them both by what he has taken and by what he returned to them. The abundance of natural resources and man's desire to meet his own necessities and "caprices" has caused significant damages to the environment, threatening the very future of human society.

Thus, the need for new ideas on the social and economic development arose, in complete harmony with the environment, known as sustainable development.

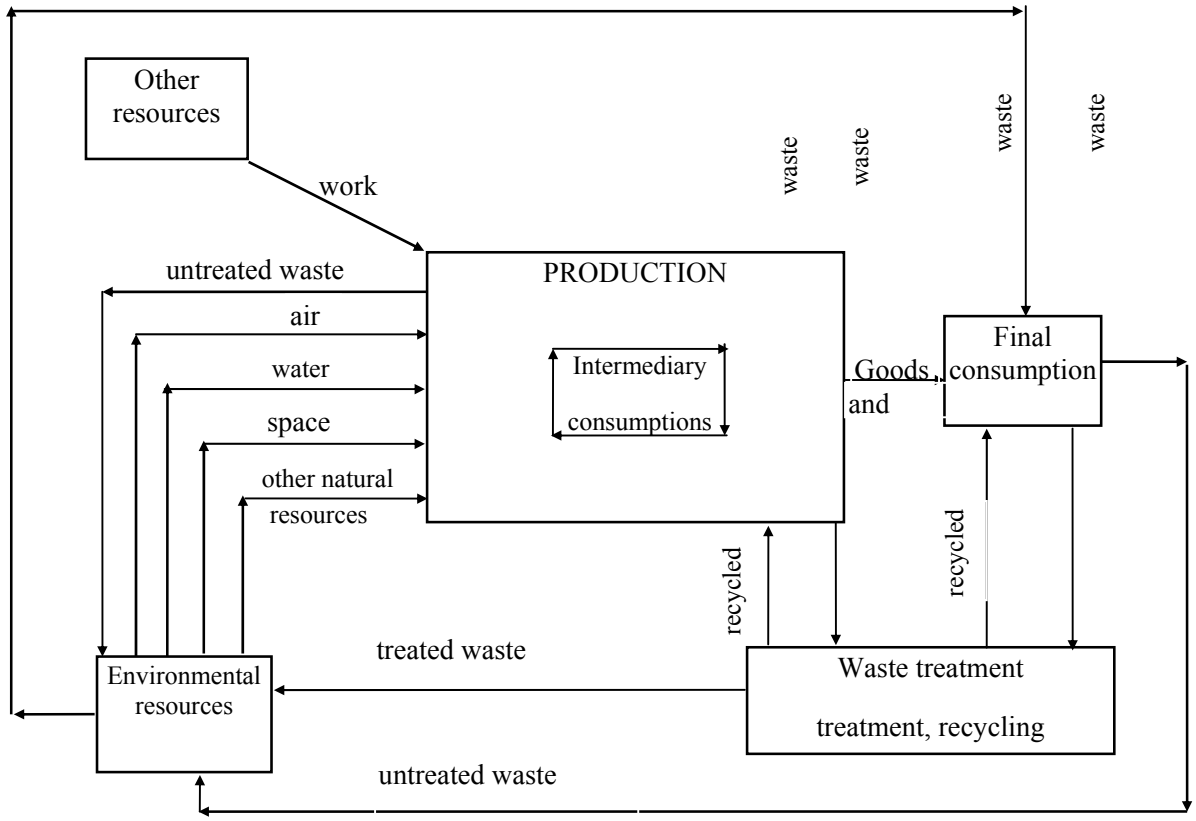

Fig.3.1 Simplified diagram of resource circuit (after J. P. Barde - Economie et politique de l'environment, Presses Universitaires de France, Pariş, 1992 taken from C. Negrei - Economia mediului, 1996)

Sustainable development has as priority requirement the relative and absolute saving of resources. Nowadays, efforts of understanding the phenomenon are made, in relation to that of environmental protection, which requires an additional consumption of resources. Therefore, the management of resources becomes a priority, which might become even more important in the following decades than the maximization of profit.

The concept of sustainable development refers to a type of economic growth which meets the needs of society *in terms of* short, medium and especially long term *welfare*. This type of development is based on a principle used in forestry, *the forest principle*. According to this principle, there should be cut more trees than there can be planted. In economic terms, this reasoning can be expressed by the imperative, for the long term, "let's live from interest rates and not from the capital".

Sustainable development also means harmonization of economic problems (economic growth including in developing countries), social problems (North-South integration and solidarity) and environmental problems (preserving "global goods": air, water, landscapes – and the

biodiversity) so that current generations can ensure that their needs are met, without compromising the possibility of future generations to meet the needs they will have. This approach must be understood both as philosophy of economic and social development, and as a new mode of action in this regard. This concept should be regarded as systemic approach of the economic-social-environmental triad, each of the subsystems having its own objectives. To these, in 2005, thanks to UNESCO contribution, the respect of cultural diversity was also added. And from here on, the major request that the environmental principles of sustainable development to be included in the global social, economic principles, within a three-dimensional approach of sustainable development issue (fig 3.2).

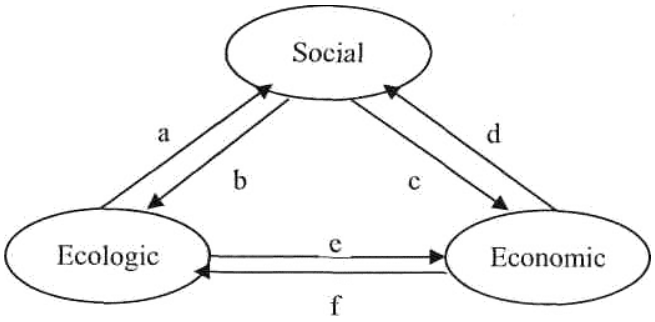

Fig.3.2. Economic, social and environmental dimensions and interaction between them (source: OECD, The Intern Report on Sustainable Development, 1999)

Where:

a. threats related to public health, or with impact on life and working conditions;
b. pressures on environmental resources; public awareness of citizens on environmental issues;
c. consumption of work force in terms of quantity and quality;
d. the issue of income distribution, the situation of available jobs;
e. involvement of environmental issues in the production, with focus on resources and waste disposal;
f. actions of pressure on environmental resources and the formulation of investments in environmental protection.

3.1. REALITIES AND PERSPECTIVES

Before showing the main theoretical constructions in the filed, let's see what possible realities we might be facing. According to the prospects of the third (declassified) report of the CIA from 2005 regarding the World Map in 2020, at that time, among the 13 relative certainties , environmental and ethical issues will also be included (in the foreground) (point 12). However,

the same document retains among the key uncertainties, on one hand, the political instability in countries producing raw materials (generated by the disruption of supplies), and on the other hand, the possibility to manage explosive situations and competition from natural resources.

Besides these precise evaluations, American projections conclude that during the next 15 years, the most important point of ethical issues, old or new, will be the ability to divide global opinions even more.

According to the same forecasts, in 2020 world economy will reach an 80% increase as compared to 2000, and the income per capita will be higher by 50%. Large parts of the world will enjoy unprecedented prosperity and, for the first time, a large part of the middle class will show up in countries considered in the recent past as poor. Since social structures from developing countries will change and, at the same time, the increase will generalize a middle class.

Anyway, at the level of actual realities, an increased interconnection will show, which will reflect in wider flows of information, technology, capitals, goods, services and individuals, in every part of the planet, perceived as a fundamental mega-tendency, a force so powerful and pervasive that will shape, substantially, all dominant tendencies of the twenty-first century world.

Our target[3] for 2050 is to have a global sustainable development. Until then, we expect the population to reach 9 billion people, 50% more than the current number, and also until then to reduce greenhouse gas emissions by 50%. This is the <50-50-50> approach that we should consider.

In the same way, with the previous statement, joins Dr. Rajendra Pachauri's message who said during the conference[4] that "if humanity continues to emit greenhouse gases at the current rate, the world will be facing a catastrophic warming in the next 50 years … the threat is so great that the fifth IPCC report (AR5), which will be presented to UNO in 2014 will also take into consideration geoengineering options". The announcement means that researchers no longer believe in a global agreement to stop the increase of temperatures through emission limitations.

3.2. CURRENT STATUS OF SUSTAINABLE DEVELOPMENT

The main element in the discussion of the first global environmental project is, without a doubt, the objective of sustainable development as a solution to compatibility between economic growth and environmental protection.

Originally defined as the type of development able to satisfy the current needs without compromising the ability to meet those of the future generations, sustainable development has fascinated the world of specialists and excited public opinion, offering hope regarding the evolution of mankind in the near future. Gradually, however, the concept has been perverted in

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[3] From the speech of Ban Ki-moon, secretary general of UNO, at the Conference on environmental changes, Cancun ,2010

[4] Conference on environmental changes, Cancun ,2010

its mere content, through various derived concepts, such as "sustainable growth", "sustainable usage", "sustainable consumption" or "sustainable partnership" or through all kinds of environmental illegal practices.

Indeed, the obtained results in terms of reconciliation of continuous increase and solving economic, social and environmental issues have not been convincing. Moreover, improved production technologies and dematerialization of economy only allow relative saving of resources, insufficient if production continues to grow.

Assimilation of environmental constraints in the development process, with all efforts of "environmental economy" based on the concept of weak sustainability has not been successful. Its postulate that the replacement of technical capital, man-made, might be possible with the exhausted natural resources, rounded by the liberal opinion on sustainability according to which market mechanism is most suitable for environmental management, does not seem to lead to the desired results. One such example is represented by the market mechanisms of Kyoto Protocol in the field of global warming.

The role of sustainable development as a possible future has thus been questionable. This depreciation of the concept, which is already announcing its abandonment and transition to the history in the near future, is also demonstrated by the theoretical attempts to find alternatives, especially through derivatives accepted by the reality.

The lack of self-regulation through prices of efficient allocation of resources, as well as demonstrating the inexistence of market's omnipotence, requires the mix of the two procedures: a limited role of the market and a space-time projection of available resource management (jointly). In fact, due to the relative lack of resources and available energy at the level of the Earth, by accepting the joint allocation of resources, man's limited progress ability is recognised, the limited understanding of environmental activity, and also the contrary economic interests of individuals, in a cultural matrix dominated by the tendency to gain income and profit (scriptural or account). The lesson taught by Georgescu-Roegen (1971) regarding the absolute priority, as well as the necessity to understand and apply the requirements of entropy law into the human action should be taught by the economists of the current generation.

The principle of interest[5] needs to broaden the scope towards collective interest and therefore change its individual-selfish perspective. Cooperation law may (re)occupy its second place (well-deserved, lawful) after the entropy law, leaving competition law the third place free (available). This law might have, under the new economic conditions (at most) the role of maintaining a necessary competitive tension.

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[5] Valeriu Ioan-Franc (coordinator) *Sustainable development and institutional.* Romanian Academy National Institute of Economic Research Expert Publishing House, Bucharest, 2006, p.83-85.

CONCLUSIONS

Considering the previous points, we may conclude on certain aspects regarding this economics-ecology relationship as a challenge of the 21st century and not only, but as a solution for the future of mankind.

The relationship between ecology and economy focuses mainly on 3 dimensions:

a) The first dimension was to clarify the theoretical-methodological framework emerged from the mathematical model describing the relationship between economic development and pollution. With this model, the identification of minimum productive levels was possible, which, depending on the absorption (assimilation) capacity of the environment does not adversely affect the quality of the environment within the existence of detention and control installations for pollution and saving phenomena, minimum levels being able to increase. Starting from the static approach of the relationship between economic development and pollution, the balance point could be identified, for which the quality of environment remains constant.

b) The second dimension refers to the legal nature of the issue. It is very important for any country to have an efficient legal environmental protection system. This can be achieved by presenting the structures of ownership and the responsibility for damages to the environment in accordance with the principle of 3P ("Polluter Pays Principle").

c) The third takes into consideration issues related to actual possibilities of action to rebuild and protect the environment (the development of eco-industry market).

Cessation of economic growth is not the most rational solution, since there are differences between the countries in the world regarding the level of economic, technological, scientific etc. development. Due to this difference, we can notice the developed countries' tendency to make capital investments in non-pollutant industries at home and in heavily pollutant industries in developing countries, without special efforts to implement clean technologies. It should also be mentioned the consumption of some huge quantities of raw materials imported from developing countries, taken at extremely low prices. Obviously, for the developing countries the solution should not be sought in stopping the economic growth, but in searching and using certain economic and political instruments, first of all, efficient, to reconcile the economic requirements of economic growth with those of environmental protection, therefore ensuring an efficient and rational allocation of resources. Accordingly, those who consume resources and pollute the environment must support economic restrictions through higher prices, progressive fees and other instruments, regardless of where the investment comes from and where it goes.

The future of human society is governed by two strongly contrasting imperatives:

1. The first one is an absolute biological imperative: learn to live in a sustainable manner on this planet! This non-negotiable and it depends on the laws of nature.

2. The second imperative is political: improve your lifestyle! This is relative and easily interpretable, because of the economic significance. The sustainable development policy makes change absolutely necessary. Two options are left, if we want the world not to fall apart beneath our eyes and with it, our hopes and dreams of a better world.

The general, principle solution of public-private partnership, with its consequences (including survival of regulation and institutionalization of public environmental interest) had to fully give up the concept of assimilating environmental protection as a minor aspect of market economy, the refusal of legal regulation and solving environmental issues by the natural self-regulation mechanism.

The exaggerated individual consumption pattern and its collective character, the western pattern that emerging counties intend to follow to develop, are therefore questionable. Any extreme is not necessarily a viable solution. Therefore, Nicolas Hulot suggests an interesting option. We cannot preach any utopian economic decrease, he believes, or to continue with this trend, believing that adaptation will be achieved by the force of things. On the contrary, he claims, we must identify and promote instruments that allow us to begin a reduction of fossil energy, the flow of materials and resources and especially to come out of the confusion civilisation. "We must head not towards a society of privations, but towards a society of moderation, economical abundance", concludes Hulot. And we must do it quickly, because the world of tomorrow, willingly or not, will be radically different from today.

The way out may occur, according to Lester Brown, an opinion that we also support, through a humanity policy and another civilisation, complementary and interdependent. Going towards a viable planetary civilisation requires overcoming the narrow-mindedness of certain traditional beliefs, such as: economic growth, development and even sustainable development and the affirmation of new ones. But this implies, besides accepting the necessity of changing the way, the actual change itself. How? Through a future historical effort of thought and conceptualization whose imperative we are trying to glimpse here and now and, why not, even foreshadow some perspectives for.

Therefore, the relationship between economy and ecology, among other coordinates, will ensure the perpetuation of the human species on earth, and if not, the concept of sustainable development, as a harmonization of this relationship, will remain a beautiful dream and mankind will head towards an uncertain future.

REFERENCES

Bălan, G.	*Sustainable Development in Territorial Profile. PhD thesis,* Romanian Academy, Economic Research Institute in Bucharest, Bucharest, 2011
Bălan, G.	*Sustainable Development and Environmental Protection.* Ed Burg, Sibiu, 2009
Bran, Florina	*Ecological Component of Economic Development Decisions (forestry and tourism)*, Bucharest, Ed ASE, 2002

Brown, R.L. — *World Economy Expands* in *World Watch Institute, Vital Signs,* W.W. Horton & Company, 2001

Brown, R.L — *Plan B 4.0. General Mobilization to Save Civilization*, Ed Expert, Bucharest, 2011

Ciupagea, C. (coordinator) — *Strategic Direction for Sustainable Development in Romania, Ed Expert, Bucharest, 2006*

Ciupagea, C, Câmpeanu, V., (coordinator) — *Energy in the Race Competitiveness-Global Warming, Ed Expert, 2007*

Ciupagea, C, Moldoveanu, M., (coordinator) — *Romania in the Context of Globalization and European Integration, Evolutions, Tendencies, Strategies, Ed Expert, Bucharest, 2007*

Detric, Ph. — *L'entreprise durable. Durod, Paris, 2005*

Froman, B., ş.a. — *Quality & Environment - Vers un Systeme de management integré, AFNOR, Paris, 1998*

Georgescu-Roegen, Nicholas — *The Entropy Law and Economic Process, Ed Politică, Bucharest, 1979*

Gore, A., — *Earth Swinging in the Balance. Ecology and the Human Spirit*, Bucharest, Ed Tehnică, 1994

Născu, H. — *Treaty on Ecosystems,* Ed ICPIAF, Cluj-Napoca, (1997).

Odum, E.P., — *Ecology and Our Endangered Life-Support Systems*, Sinauer Associates Inc. Publishers Sunderland, Massachusetts, 1997

Petrella, R. — *Globalization and Internationalization: The Dynamics of the Emerging World Order, in Boyer, R., and D. Drache States Against Markets: The Limits of Globalization, London, Routledg, 1996*

Popescu, I., collective — *Sustainable Development. A Romanian Perspective.* Ed Economică, Bucharest, 2005.

Rojanschi, V., ş.a., — *Environmental impact assessment and environmental audit*, Bucharest, Ed ASE, 2004

The Report *The Economics of Ecosystems and Biodiversity* http://www.teebweb.org

The Report Measuring Progress towards a more sustainable Europe
http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-

77-07-115

The Report *Millennium Ecosystem Assessment*, 2005 http://www.maweb.org/en/index.aspx

The Report *Our common future*: http://www.un-documents.net/ocf-cf.htm

World Summit for Sustainable Development: www.wssd.com

Euractiv.ro News http://www.euractiv.ro/uniunea-europeana

UNESCO: www.unesco.org

World Business Council for Sustainable Development: www.wbcsd.org

http://ecologienutritiesisanatate.blogspot.com/2011/01/romania-lupta-cu-incalzirea-globala-in.html

www.realitatea.net

www.gov.ro

http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P7-TA-2010-0442+0+DOC+XML+V0//RO