THE ECOLOGICAL EDUCATION IN ROMANIA IN CONTEXT OF THE DEVELOPMENT DURABLE

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Abstract. *The goal of ecological education consists in the improving capacity of graduates and population, generally, to understand the complexity of environment organization, as integrity, quality and productivity of ecosystems that express in fact, their supply of goods and services, directly condition the health state and welfare of population, inclusive of the human ones as well as the accumulation by these of knowledge and values that to allow them the sustainable development.*

1. Introduction

The present system of public education and training of human resources performs a series of deficiencies mainly caused by:

- the organization of this is based on the approach per sectors of phenomena being incapable to overtake the actions conjugated of socio – economic system (SES) on environment components;
- the education planes are improper in a great measure that do not have the capacity to ensure the efficiency level acceptable in terms of knowledge by graduates with a view to warning of processes and phenomena that damage to ecosystems;
- the human resources from education system the necessary equipments and literature are missing at all levels of education;

there are not studies about effects on environment of majority sectors of activity from SES and mainly in the case of great pollutants from heavy industry, manufacturing, alimentary industry, etc

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2. Content

Inefficiency of mechanisms and education instruments specific to present moment is first due to the fact that in the present moment the accent almost exclusively falls on the theoretic aspects that being presented **per sectors** and without continuity cannot reach finality to demonstrate, in fact, studying the ways in which the processes and phenomena made or brought about in SES damage the environment.

The elements that compound the ecological systems, support of life on planet being separately treated cannot ensure forming and development of abilities necessary to identify the behaviours of natural capital (NC), like organized structures systemic integrated in the hierarchy organized as so-called environment, only able to produce goods and services for the maintaining and development of SSE safely.

Unfortunately, this lack of competence has had and have very grave results because it allows and even encourages taking and standing in the practical and managerial activities some solutions and non congruent, partial, and incomplete points of view of some policies and therapeutic and curative strategies of environmental protection programs restricted in space and time that result in the reducing of deterioration rate without to prevent the negative effects, predictable and do not try in fact, to keep a check all process permanently. In this way, often the environment protection, mainly from the former communist countries that have had ministries for the environment issues, regarding it with disfavour on the development way.

At the same time, in the post – Decembrist Period that is covered the inefficiency and limits of training programmes of public mass are kept and amplified by the absence or inefficiency NGOs firstly determined by distorted image of these about the present situation of SSE and relationships of it with NC components.

As a matter of fact, it must be remarked the fact that firstly, need training the members of NGOs specialized as well as the ones of other training environments that could contribute at the education and awareness of mass public as even the human resource from these environments prove a **distorted** image on the present situation of natural capital and its relationship with SSE.

The actions that follow the restructuration and development of flexible and performant system of population education and formation of the human resources able to understand the new relation between economics and ecology have to keep in eyes at least the following plans:

- ✓ The basis education or the formal one that will be offered all young people with this formatting of the human resources specialized;
- ✓ The formatting of the human resources specialized;
- ✓ The informal education and continuous training that will have to realize in situations and context out of the education system.

Such programs can become coherent educative instruments supported in conceptual aspects and practical applications that go to a holistic approach, integrated to the sustainable management principles in both SES compartments and conservation the biodiversity and natural capital.

The efficiency of the educative-training activities in the ecological environment will be possible by join during the training period, theoretical aspects with the practical/ applicable ones with a projects series and concrete activities in the respective geographic space.

To achieve the three programmes as part of the study follows to project some pedagogical issues (handbooks, course note, etc) necessary to development some courses adapted to different parts of population endorsed (pupils, students, for master' degree, etc.).

2.1. The deterioration of environment components

The deterioration of environment components (atmosphere, hydrosphere, lithosphere, biosphere) like parts of ecosystems is a real process that accompanies the development process of socio-economic system.

The human society development having like driving force the demographic growing but the desires increase materially and non materially of people and human community, generates multiplying and diversification the means and technologies of extraction of renewable and non renewable resources as well as services supply by the natural ecosystems.

Therefore, it has been multiplied and diversified the connexions of socio-economic system with the natural ecosystems, connexions that ensure on the one hand the transfer of resources generated by the natural ones to the socio-economic systems and the other hand the transfer of secondary products (of waste and residues) and even some final products (goods) to the natural ecosystems.

In this country like in majority countries in Eastern and Central European the deterioration process of natural capital is amplified due to the attitude of **decision making** people and human communities against the relation of socio-economic systems with the natural ecosystems. At present, this relationship is supported by the wrong principles that start from the premise that the development of socio-economic systems can be unlimited supported on the resources and support capacity generated by ecosystems.

Just due to non correlation of pressure generated by the socio-economic system built and controlled by human species on the natural ecosystems with the productive capacity and the support one of these, frequency of damages at the local level (that is at the ecosystems level), at the regional one (of ecosystems complexes) and at the global one (of ecosphere – planetary ecosystem) has exponentially grown and amplified. This is the question of whose efficiently solve during the time as short as possible it found the real solution and as complete as possible as-called – *the sustainable development.*

The solution *the sustainable development* does not arise of its own accord but has gradually built at the same time with the formation and development of ecology like science and its evolution to *the systemic ecology*.

The practice of human society has gradually imposed necessity to clear first some aspects of human – nature relationship first bond as human in nature and then gradually by desire of this arising to rule over and subordination to his interests anything beyond his life community.

2.2. The systemic organization of the Universe

The accumulation one volume more and more of knowledge on the surrounding world, the research different forms of matter moving, the research of fundamental processes from the Universe have gradually led at the conclusion that ***the whole Universe, from atom to galaxies, is organised after a unique - systemic model.***

Therefore, the system theory done according to this idea defined the system like an elements assembly found in interaction. Every system has an environment made of all phenomena from outside of system which influence it or are influenced by it.

The system is not a simple agglomeration of elements but a unit organized with a structure depending on connexions that ensure it stability and determine its behaviour like a whole that represents much more than the parts sum.

The system has its own characteristics that have not the component elements and distinguish it by agglomerations without organisation that cannot be named systems because have not distinct characteristic differently by the ones of their components.

The system components are organized into subsystems, and laws of subsystems development are subjected to the laws of system development.
Therefore, the systemic ecology is the result of accumulation mainly qualitatively referring to the identification of real entities and description of dynamic of real productivities capacities and description of dynamic of productive capacities and of support of ecosystems depending on the systemic analysis. The theoretical basis of the systemic ecology is defined by the concept of systemic and hierarchical organization of the physic-chemical and natural biological environment but of the one changed or done by the human species.
The systemic concept has done the theoretical basis of ecology, namely the conceptual force and means to understand and perform the physic-chemical environment as a hierarchy of great and complex systems and the systemic analysis has done the ecological systems identification and depicting their behaviours.
The integrated systemic approaching allows not only the identifying of ecological systems but even the separation and depicting of superior hierarchical systems inclusively the authoritative ones and the design and development of support informational systems necessary to the integrated management organisation of these.
These demonstrations are necessary because the damages of ecological systems and generally of components of natural capital that ensures the material and energetic resources but services by which depend the population health (inclusively the human one) is a real process that accompanies the socio – economic systems development done by the human communities.
Today, there is unanimous accepted the fact that the socio – economic systems development has been possible only due to diversification of access performance and usage of renewable and non renewable resources as well as of services done by the natural and semi natural systems.
Practically, in its evolution the mankind has multiplied the socio-economic system connexions with the natural ones, connexions that ensure on the one hand the resources transfer done in the natural and semi natural systems to the socio – economic systems and the other hand the transfer of secondary products (residual) and even some final products resulted from the technological processes or other human activities to the natural and semi natural systems.
Therefore, these natural and semi natural systems are subjected to a pressure more and more during the socio – economic systems development.
Examples of outrun of ecosystems support capacity or substitute trying of the natural resources is met everywhere.

Even the neo classical economic theory undergoes that the economical systems are designed on the principle interdependence of these against the environment as the problems of resources about exclusively market mechanisms are used.
Unfortunately, the exaggerate optimism is generated by the idea as regards the possibilities of substituting of natural resources with the ones that could be ensured by the capital components done by human being by means of the technological progress.
The theory extremely injurious because it ignores the material and energetic fluxes analysis in the economic systems, depending on the energy and mass conservation principle known also like the entropy principle. From this principle resulting the production process that is in fact, a transformation process of resources in the usage and unusage products (wastes), namely the work and capital are transformation agents or efficiency factors and the resources (energy concentrated) are the object of transformation or material factors.
In this equation some changing agents can be substituted with the other and some resources with the other but in no way cannot be substitute the resources with the changing agents, namely the two components of production process are complementary.

These ideas means in fact, the spinal column of a science that develops by the interdisciplinary integration after 1990s known generically as ecological economy promoted mainly by the London school that has formulated and developed the key concepts of the ecological economy such as the natural capital, the total sustainability, partial sustainability, uncertainty, reversibility and irreversibility like characteristics of the natural capital.
Therefore, the ecological education has to implant in young people's and people's mind generally, concepts like equilibrium and harmony and therefore, the economic activity at any level, has not too done and analysed only like an integrant part of a given natural system. This require has to respect even if one part from the natural resources can be substituted technologically, but only with the condition as the technologies to be clean and the products and sub products can be metabolized by the bio-geo-chemical circuits and not to be accumulated into the bodies and environments, affecting directly or indirectly their capacities of defence.
Following logic, at the higher space-temporal scales is evident that due the correlation of the pressure made by the socio-economic system led and controlled by the human species on the natural and semi natural systems with the productive and support capacity limited, the defects frequency has grown with an exponential rate.

This concept just demonstrates the imperative necessity of protection of natural capital that practically cannot start only with the attitude changing in exploitation and generally in the resources administration.
The real and all solution of this question have been made at the same time with the concept definition of the sustainable development that claims as has been demonstrated to sustainability.
The syntagm of man – master of nature or the idea of struggle to subdue naturii or the similar ones, have to forget them and the success in these requests depend on the actors capacity involved as the political factor and the one of decision making, the education factors like school, family and church, the governmental and non governmental organizations and even the mass people to adopt and carry out startegies, action programmes and plans depending on the conceptual requires specificaly to the sustainable development.
To implementation some action programmes and plans have to carry out some key requests that to ensure the achievement of sustainable transition objectives of socio-economic systems:

- the communities efficiency starting with the school education but after to build to the human being a new approach, the system one of universe that to allow to human not only the onformation accumulation but also the understanding and performing accurately of these.
- training on the same lines and the ones who administrative and politic decision making from all levels starting with townhalls and ending with legislative and executive members to able to adopt policies and objectives but to able

to undertake actions that to change into practices the policies or to carry out the objectives;

- the qualification at the high standards of profile human resources in the universitary and
- post universitary environments, expertise resource that to be able to influence decisively the long – term decisions and from all levels.

To carry out these requests both at the school level and at other systems of education and perfecting it is supposed to identify the main mechanisms ad means that to ensure the mentalities, thinking mind and action against the environment.
Therefore, if the dynamics of the natural acpital components is associated with the dynamics of the stability fileds, it results that the socio-economical systems management assumes an alternation or a parallelism on long term between the economical increase phases and those of qualitative and structural perfecting.

Then, during these phases the structural and functional rehabilitation of some previously deteriorated systems have to take place, meaning that at least part of the dameges caused to the environment have to be repaired and thus, the premises of new economical phases to be created.
In educational plan, the training of the public with the view to some climatic changes or of other nature which are in contradiction with the value system for which the public was prepared and got acustomed with, becomes obviuos along with the mentality and the thinking way changes to the environment.
At the same time, it is necessary to change the personal attitudes and practices which means to use more efficiently the resources and to change the economical mechanisms, trade and other interstate politics, because transition towards sustainable development cannot be national or regional, as well as environmental organization and pollution do not have borders.
At the top of the decisional political system, of the higher education and especially of the speciality human resources training system, there is also another educational objective provided by the necessisty of some suplementary clarifications in the conceptual plan upon one of the key terms of the production function of any socio-economical system, represented by regenerable and non-regenerable resources, respectivelly, upon the functional structures of the environment – ecological systems which produce these resources and represent in fact, the bases of life on the planet Earth and implicitly, the socio-economica; systems support.
These `solutions are necessary from the perspective of a new aproach on the natural capital, generated by the systemic ecology. From this perspective, the natural capital is practically interppreted through the way the physical, chemical and biological environment is perceived as a whole.
Thus, the natural capital (NC) comprises all natural and seminatural ecological systems which sustain themselves and develop in the sense of maximization of the energetic flux, of perfecting the mechanisms that recycle the raw materials used in the manufacturing process, of perfecting the coupled mechanisms which keep their dynamics.
It becomes extremely important for thr development politics and strategies that in order to guarantee the socio-economical system perenity it has to be understood clearly that is is compulsory to preserve at any levels (national, regional, global) a heterogenuous stock of natural and seminatural systems able to produce natural resources and services such as the climatic system control, water circuit, water filtering, air filtering, pedogenesis, etc.

Theoretically, all types of resources produced by the natural capital, meaning the biological resources, water resources, soil, minerals, fuel, building materials, such as rocks (sand, stones, gritsones) are renewable.
But the renewable time scale of the main resources is incompatible with the natural capital managemnt designing and socio-economical system time scale and, therefore, if the ores and fossile combustible have a long period of replacing –from hundreds to million of years, and their managemnt is desingned at a scale of 5-15 years, it is obvious that part of these resources become non-renewable.
In conclusion, an important request of the sustainable development stays in the functional integrity preservation and implicitly in that of the natural capital components productivity, keeping the exploiting rate below that of producing these resources, and for the energetic resources, some alternative resources have to be found.
Because keeping the natural capital percentage over a critical level is not enough, it is important to preserve its structural and functional heterogenity, meaning yhat it has to be preserved the ecological and biological diversity, an objectiv that represents the key of the natural capital preservation as a support and guarantee of the socio-economical systems development.
The systemic aproach inposes to conceive the diversity not only as a species wealthiness, but also to comprise here the diversity of the structural and functional modalities which are part of the organized hierarchies of the physical, chemical and biological environment.
These are some arguments which aim to help people in changing the mentality regarding the environment, and people have to be presented the main damages caused to the environment, from simple to complex, through the socio-economical system activities, in order to reach a change in the attitude, as a prime objectiv of the new type of education.
The attitude is the prime factor which determines the condition and the attitude towards the environment is the first manifestation of man no matter his age is, or his affiliation to an organization.
The attitude as an objective of education do not have to aim only at the man position towards the environment, but also at some other behavioral elements that should characterize the feature of good citizen, such as:

- arrangements and promises respecting;
- assuming responsabilities;
- selfdiscipline;
- understanding to human mistakes and omissions.

It is wrong to transmit information without „bending" them to processes, phenomena, rules, because providing information do not develop attitudes or even can create conditions and, more rarely, dangerous ideas.
Basically, the good citizen behaviour is part of the requirements, and satisfies the sustainable development mechanisms and the ecological ethics principles, or those of the earth ethics.

Ethics do not have to be concerned only by relations between humans.
The scientific argument for this assumption is quite simple: the goodwealth of people do not depend only on the technological performance which mantains economic increase, because these mentalities proved to be already bankrupt. What is the point of the whealth increase if life on the planet is so much affected by climatic excesses, provoked by gasses emission for example, which have a greenhouse effect, or by the synthesis compound responsible for the suplementary dissociation of ozone and implicitly, the ozone layer narrowing, all these caused by the „performant" technologies themselves.
The educational system has to make people understand some operational aspects of the sustainable development concept:

- spacially, the sustainable development refers to the whole planet;
- temporarily, the sustainable development has a trans-organizational frame, meaning that there is a connection between „sustainability" and ethics issues – „the future generations right" to satisfy their needs.
- spacial-temporarily, the sustainable development refers to needs and supports the needs satisfaction also for the less developed countries, even if this thing assumes diminishing the overdimensioned consumption from the highely industrialized countrie, thus introducing the idea of equity, which induces the ideea of agressing the environment, for example, because of the emissions level;
- sustainable development implies an interdisciplinary aproach and, as a result, in the simplest form it assumes the coordination of social, economic and environmental requests.

At another level of education, at the level of managers trening, it has to be done the connection of the sustainable development principles with the concept of ecological security, which is becoming clearer.

The textbooks, from primary school, as well as lectures, have to present aspects from nature based on researches:

- *air temperature measurement and then, in the field, at the edge of the forest, inside the forest;*

- *surface water leakage measurement in the forest and in the open field, measurement of all waters, of the entrophyzation degree, of the dissolved oxigen level, of light, of rains etc;*

- *soil and atmosphere humidity measurement, of air composition, of wind speed.*

On another level of education, the curriculums have to aim at guiding lines with regard to the behaviour and attitudes for persons and communities, with explanations on the functioning mechanisms of the ecological systems from simple to complex, the way they interact, manifest their productive capacity both for the resources and for services, in principal.

For example, the biodiversity protection is not a goal in itself, it does not mean the search for resources for the planet inhabitants, it means not to interfere with the nets, connexions and mechanisms that assure the interdependency, reciprocity, capacity of reaction.

Very recent researches R. Constanza - Gross world product from International Monetary Fund (IMF), World Economic Outlook, October 1996, Washington, DC) affirm on scientific proves that the economical current value of the forestry ecosystems services of the world is of at least 16-54 thousands of billions $/year, exceeding even the world gross product, which was of 28 thousands of billions $ in 1995.

That is why it is estimated that is absolutely necessary to give back to the nature at least a third of the vital space of the planet, under different forms such as „protected areas, reservations, natural parks, genofunds protection parks etc", interconnected through natural coridors and protected rom man intervention.

Unfortunately, humans have to be re-educated in the direction of living within biodiversity, starting with ordinary behavioral actions which are not in contravention with the earth etichal principles, and with the sustainability requests etc.

Conclusions

The support capacity of the ecosystems, as an expression of their stability field will have to be known and respected firstly by minimalizing the interference with the natural and seminatural ecosystems which produce resources and services, and the extracted resources from the natural cycles will have to be used as rational and coplete as possible.

Avoiding the negative extremities is another principle of living in community and this is achievable firstly by quiting those facts and actions harmfull to the rest of human community, or the other components of the biosphere (use of pesticides, food aditives and others, technological poisoning of waters through harmful technologies such as introduction of salted water in oil layers, orea treatment, fertilizers use, etc).

Generally, the human communities have to be rearranged in order to respect the environment principles and, educated from simple to complex, in order to respect the commun usage rules of the existant resources.

An ecological-educated person will be the one that by his behaviour will minimize his interferation with the biosphere not only by reevaluating his personal needs, but also his desires, which are practically infinite and also harmful.

Ecological education continues torepresent a crucial element for the succes of any organizations and of any action plans, that will have to respect the sustainable development principles. It will have to penetrate all fields of activity, the whole SES, including the and culture and also, all decisional and power levels.

In order to make all these requirement come true, parallely, the higher education system will have to provide the human resource training with expertise in functioning and dynamics of ecological systems, which has to be able to give speciality assistance for the correct dimenssioning of the human activities and, for achieving analysis of life cycles and risks evaluation.