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Natural capital and sustainability of economy: noospheric model of development

The creation of ecologically sustainable economy, aimed at foreseeing negative natural and socially - economical changes, has its own peculiarities. The interconnection between the development of economical and natural processes is spatially determined. Thus, the noosphere function of preserving the environment in economy has different aims and criteria than productive. It is aimed at accumulation not economical but ecological good by preserving biophysical order (negentropy) in every local, regional or state ecological-sociosystem (ESS). The link between these two functions, as we have clarified already, is the sphere of nature management. The nature management, while combining human and natural capital can use solar energy and keep it on the planet. The principle role here belong to conscious human activity, aimed at formation of new geological layer of planet -- noosphere. Thus the function of noosphere should be perceived as socio - ecological one. For achieving the ecologically sustainable kind of development, the main task is maximal augmentation of negentropy as a source of preserving organic life on our planet. The economical process, connected with the usage of natural capital, should become adequate to the laws of preserving biosphere, acting according to biophysical criteria. If the productive function determine the aggregate supply of economical good through marketing, the noosphere function should determine the aggregate ecological supply of natural capital's good by taking the biophysical laws of natural organization as a background. Thus one can come up to the formation of mechanism of stable development realization.

It should be admitted, that in modern scientific literature these problem are methodologically unsolved as yet. Very often the economical mechanism of ecologically sustainable development is equaled to the economical mechanism of regulation of nature management sphere. To our mind such approach is methodologically wrong. Only the mechanism, directing economical process against negative ecological results can be regarded as effective one. We think that the inset of ecological aims into the economical interests of economy subjects on micro and mezzo levels is possible in case new variables are introduced into macroeconomic analysis that would determine the biophysical, natural limits for running of economy in the local territory. Modern theory of general macroeconomic equilibrium that deals with the factors of achieving the mentioned above state in economy should be supported by the theory of balanced development of ESS as spatial components of noosphere. While studying the evolution of balanced development of ESS , it is not enough to research the factors of achieving of economical and natural balance of inner process. Economical equilibrium ignore natural, biophysical possibilities of usage of ESS`s natural capital. At the same, according to biophysical laws of the attainment of equilibrium state by natural processes means that the potential of capacity of natural subsystems, opened to environment is .

Theory of general macroeconomic equilibrium also does not take into account the peculiarities of natural – economical interdependencies that are of different value and biophysical laws can't correlate the supply of natural good with social demand for it. The question arise: how can one reach the resonance of economical activity to the natural organization of biosphere?

Economical activity has to provide the stable functioning of biosphere, having adapted to natural laws and mechanism of energetic, informational and metabolic exchange process. Thus, of most importance here is not the state of equilibrium but the state of stability of negentropic budget.

Such state in ESS is possible if the economical processes of natural management are in correlation with the potential of biophysical capacity of its natural capital. As the example of

stability of negentropian budget in biophysical systems the stability of molecule H₂O or CO₂ can be drawn.

The stability of negentropian budget of each local territory, as it has been mentioned already, is, according to V. Vernadsky law about conservation of biomes, the main precondition of biomes conservation. Thus, the natural capital that together with human capital preserves biophysical order on the planet is called absolute capital and its function could be regarded to be noospherean one.

The function of production of every ESS depends on the thermodynamic functions of spare energy of its natural capital. The ecological supply of ESS (instead of economic supply of some kind of natural capital) becomes a priority criterion. From the point of view of the conventional economics of nature management, if the resources are replenishable it is possible to increase their consumption regardless of the fact that this consumption may break or decrease the reserve of spare energy necessary for the functioning of biogeocenosis. That is why it is not enough just to know economic (artificial) demand and supply for any natural capital. It is important to take into account thermodynamic criteria of preserving the natural environment.

On the macroeconomic level it means that the amount of GNP created in nature management depends not only on the economic components:

$$Y=C+I+G+NX \quad (1)$$

where C – consumption;

I – investments;

G – state purchase;

NX – net export,

But also on biophysical components of the total ecological supply of ESS:

$$Y_n=C_n+I_n-A_n \quad (2)$$

where Y_n- ecological supply of ESS;

C_n- consumption of internal energy in the process of biophysical, social and economic work in ESS;

I_n – investments of negentropia (order, that comes from the solar energy);

A_n – the amount of entropy, created from the biophysical, social and economic work in ESS.

The analysis of interdependence between the components of the total supply of ecological welfare and the total supply of economic welfare was done on the basis of aggregation of the corresponding showing of the mezolevel of ESS and made it possible to formulate the tasks of noosphere model of the development of ecologically balanced economy:

1. The functioning of the noosphere as a planetary ecological and social system causes its ability of self-organization through increasing its spare energy. In this context processes of self-organization of economic systems that are performed through the conventional market mechanism are not equal to the processes of self-organization of ecosocio-systems, since they do not provide for keeping to the norms of nature.
2. The process of self-organization in ESS happens according to the biophysical rules of the development of natural subsystems. It is them what the socio-economic systems should be adjusted to by building an adequate to the natural abilities of biogeocenosis economic activity.
3. Every ESS is self-organized only under the condition of decreasing entropy (increasing negentropia). That is why in the process of co evolution of the natural and socio-economic subsystems only those forms of their organization are realized that can decrease entropy of the whole system.
4. In the basis of ESS self-organization lies an algorithm of searching the mechanisms of interdependence that corresponds to their (ESS) structural hierarchy. The principal characteristic of their functioning is demand and supply for self-organization. In order to ensure the coordination of the processes of self-organization of the system a supply is formed on each level of its internal structures. A demand is formed accordingly.

Evolution of ESS happens cyclically through the gradual change of the slow stage of development into the stage of instant change of the form of its organization. This change happens through the point of bifurcation and is followed by self-organization of the system. After the bifurcation, however, the system may have several possible ways of a further development. That is why the task of the society is to react on those changes in time

Modern tendencies, formed because of deteriorated ecological-social situation call for determining national priorities of ecologically balanced development in Ukraine. But these problems comprise just a small part in national programs of economic reformation. More often than not their solution is approached formally, without profound analysis of transitional economic peculiarities. Such circumstances lead to non adequate results and consequences of economic transformations and complicate the process of formation of socially-oriented market economics in the country.

Recently, the discussion over sustainable development problems resolves itself to issue of expenses. In this context financial problems of our country do not influence the realization of western model of ecologically –balanced development. Considering peculiar conditions, formed in home transitional economics it seems expedient to focus the utmost attention on balanced nature management. It doesn't call for extra financial recourses, just for the strategic management by introducing new noosphere model and it's functions into the macroeconomic analysis. That is why the primary issues of nowadays is the formation of affective mechanism of balanced resources marketing. First of all through exploration of formation of natural capital recourses market in Ukraine on the basis of its all-round inventory and ecological accounting is meant. This will give a possibility to preserve considerably recourses –energetic goods of home nature capital, without which both economic and social progress is out of the question.

Special attention should be paid to the protection of the state land resources. The case in point is the necessity of introducing the strategy of land management thoroughly preventing erosion and degradation of the soil on the basis of ecological agricultural and landscape limitations. The previous long-lasting technocratic conception of agricultural development based on the quantity increase of technical, ameliorative and chemical factors and on the maximum usage of land resources, did not provide either its efficiency increase or the improvement of foodstuffs quality. But it caused negative anthropogenic loading on nature and undermined its auto-regulating and restoration capacity.

At the same time great harm to the agriculture is caused by ecologically unbalanced forest management and the increase of forest devastation in the last years, especially in the Carpathian region, that led to stability decrease of exchange processes in nature, and as a result, to the flooding and damage of the agricultural lands.

Thus, the present state of agricultural development in Ukraine is characterized by the complication of ecologic situation. According to the researches held in the Institute of Agriculture of Ukraine, as of the year 1998 eroded agricultural lands of all kinds in Ukrainian farms made 15.3 million hectares (46.2% of their area) and were concentrated mostly in the southern(41.7%), northern and central plains (33.1%). Because of ignoring the factors of ecologically balanced agricultural development and the absence of proper protection from water and wind erosion our state loses 450 million metric centners of soil. And, as a result, general shortage of production is over 100 million metric centners of conventional grain, that is the equivalent of 22.6 billion hryvnias of economic losses.

In such a situation elimination of physical soil degradation should become the priority tendency on the path of ecologically balanced nature management. Present-day practice of soil treatment should be reconsidered as soon as possible. According to the academician V. Medvediev's appraisal it deserves only 3 marks on a ten-mark scale. Therefore the widest introducing of soil protection systems and the compromise in the shift of crops is very topical. We should improve the land structure and form highly productive, ecologically stable agricultural landscapes. For this purpose the tillage of cultivable lands should be lowered by 50%, and the share of forests, pastures should be increased by 20%, the number of forest stands – by 20-22%, the area of lands of the nature protection fund should reach the average world level (5%). Forms of property in agriculture should be changed with regard to the requirements of ecologically balanced land management. In this regard we should understand that new land owners and land holders do not always have knowledge needed for realization of projects of soil protection from water and wind erosion. Hence the land reform should be accompanied by the creation of relevant local centers dealing with ecological education. Thus, biophysical criteria and requirements of ecologically balanced land management should become major in the process of land privatisation.