

## THE STREAM OF EVOLUTION AND THE EVOLUTION OF A RIVER

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A river is a beautiful image of everlasting and mysterious evolution. When we look at water in a river we do not know where it is going or what its goal is. However, we know for certain that the result of evolution is irreversible. The role of a river changes during the evolution of a society. The river was one of the most important channels of communication at the beginning of civilisation. The process of ethnogenesis is particularly intensive when the river crosses the line between forest and steppe.

Today's rivers are transformed by industrial and post-industrial societies to anthropogenic objects which consist of several systems of water regulation. Sometimes the river is only a chain of artificial lakes. The river is also the channel of pollution. So, in fact, rivers, as a rule, have irreversibly gone over from the natural channel of communications and information to the anthropogenic channel of transferral of trans-border pollution. This is a natural evolutionary development and we must recognise that the global evolutionary river has a lot of different streams. For example, countries which are situated along the Danube have played a specific role in the development of the global environmental crisis.

The evolution of society in these countries has characteristics similar to a "bifurcation process." Depressed economies have experienced different starting conditions and the negative effects of large-scale technology are evident in the high level of water, air and soil pollution. There is little chance of getting the state to invest in the reconstruction of environmentally-hazardous industry before the end of this depression period. Unfortunately past mistakes cannot be changed.

In the process of transformation, society has been doubly impacted by the high level of unemployment and poor public health in regions where obsolete large-scale technologies had been implemented. It is very difficult to ensure the right to life and health when new markets are being formed at such short notice. In reality, environmental problems will become a priority only when the problems of the transformation of the scale of values in society are resolved.

Many believe that sustainable development is the process of limiting and optimising the consumption of natural resources. Hopefully, in the future, society will take the next evolutionary step. After society ceases to function as a civilisation of consumption of natural resources, it will be possible to contemplate this problem. In this case the main question is no longer how but what for.

In Eastern and Central Europe, the process of privatisation has created a tremendous number of new costs. This is the result of the fact, that, in a centralised economy, goods and services, such as land, technologies and large and middle scale businesses, are not considered objects for selling or buying. In countries with a classic market economy and stable development, the cost level of similar objects has been fixed. Market limits have been fixed. Market development in Eastern Europe does not clearly distinguish between market and non-market objects of privatisation. For example, the environment and spiritual and moral development cannot be estimated on a conventional cost scale.

Market space limits are fixed by a system of value estimations of investment effectiveness. Besides traditional economics techniques, damage to the environment and the effective usage of natural resources should be included in the system. This cuts investment risks. It is very important to say that the economic estimate of damage and the usage of resources in the system have their limits. Unfortunately, in a human-oriented market, catering to our spiritual and moral needs, ethical rules, religion, or history, nature is left out of the market space. It cannot be estimated using conventional cost scales.

Urban conglomerates and industrial regions along the river, and in the whole world, are saturated with anthropogenic morphostructures; dumps, mines, pipelines, railways, highways and others. The surface of the Earth, an area of many millions of square kilometres, includes a quarter of these objects. Such big-scale community development has resulted in irreversible changes in the global landscape, water, atmosphere, flora and fauna. In addition, there have been changes in the chemical composition of the air, and in the level and chemical composition of underground and reservoir water. Great unnatural anomalies in gravitational and electromagnetic fields should also be mentioned. Finally, the geo-chemical circulation of terrestrial chemical elements has changed.

An irreconcilable conflict with nature is present everywhere. Numerous scientific prospects maintain that industrial regions and megacities are a new anthropological environment of human existence. V.I. Vernadski, the founder of the Ukrainian Academy of Sciences, and Teilhard de Chardin, his colleague from France, pointed out these phenomena.

Here are some figures on the Kriviy Rig iron-ore basin. During the last 80 years, more than 0.5 billion tons a year was mined out of an area of 500 km<sup>2</sup>. 300-400 million m<sup>3</sup> remained in the dumps and 80-100 million m<sup>3</sup> were the wastes of the ore extraction. Today, eleven open pits and twelve mines are located in an area of 110 km<sup>2</sup>. The average size of the open pits is 2 x 0.8 km and the depth, by now, is 400 m. The mines have already crossed the 1,300 m limit and they eject on the surface 11-12 million m<sup>3</sup> of highly mineralised salt water. The total area of the dumps is 70 km<sup>2</sup>. Their height, in some cases, exceeds 100 m and their mass is more than 7 billion tons. 3.5 billion tons of slime are stored and over 60 million m<sup>3</sup> of mineralised mine water have been accumulated in the ore slime storage facilities over an area of 60 km<sup>2</sup>.

All this gives ground to convincingly ascertain that in industrial and urbanised regions of the planet, the environment has irreversibly gone over from the natural to the anthropogenic state. Under such conditions, the approach to the management of environmental protection and ecological activity is no longer effective. Indeed, we are making an anthropogenic artificial ecological system. Does it make sense to speak about environmental protection? What do we mean by restoration of the environment? There arises the problem of what strategy to use in the urbanised and industrial regions' ecological management. But, nowadays, managers, surrendering to the inertia of thinking, direct financial and resource floods into the restoration and protection of the environment. However, they are directing them to mirages.

To make a decision concerning environmental protection and restoration, managers use economic methods of evaluation of the damage caused as a result of the use of nature. However, when irreversible changes have occurred, economic methods are not always effective. Try to evaluate the losses from the deterioration of the landscape, extinction of biological species, or the irreversible tearing away of agricultural lands for urban construction, industrial building sites etc. The problem in the strategy is connected with the choice of methods with the help of which ecological decision risk evaluation is made. In our huge cities, no natural ecosystem has remained intact. People live in a man-made environment, comprising only a few natural islets. Sometimes one can see town forest-parks with traditional squirrels and birds, white clouds in the occasionally blue sky background and the ever mysterious movement of the still nice and warm river water. Yet, there remain human values and natural human rights, the indisputability of which had been proved by the Encyclopaedists Voltaire, Montaigne and Rousseau back in the 18th century. First of all comes the right to life, and to spiritual and physical health.

In regions where anthropogenic ecosystems have been created, the strategy of environmental management should primarily take into account biological and social comfort. In this case, managerial decisions should take special care not to damage Mother Nature while protecting man. This applies to the cases of toxic and radioactive wastes storage, dirty production, etc. Any environmental decision must contain rigid axiomatic restrictions: Man's comfort in the anthro-pogenic ecosystem must not damage the environment! Environmental management strategy must be built on the principles of quality of life. Then, risk can be appraised with the help of well-known sociological indexes of quality of life. Making use of these indexes, the manager asks the question: "How do specific technologies affect our lives?" When economic criteria are applied, the question is narrowed down to: "How much must society pay for ecological damage?"

In fact, the economic driving force is one of the main forces in modern society. That is why the single most widely used indicator is the Gross National Product (GNP). A measure of the total output of goods and services in an economy, the GNP is the basic rule for a lot of countries. The experience of using the GNP index shows some failures in its ability to assess long-term progress. One such failure is the problem with the estimation of environmental damage.

Traditional criteria and techniques used in economics - level of damage to nature, cost of prevented damage, and the efficiency of preferential resource utilisation - do not take into account human rights. It is of big interest to use for this aim the well-known social indexes fruitfully elaborated by Bauer, Brundtland, Nordhouse, and Toffler, which specifically emphasised the conditions of personality realisation. This is why D. Toybin and W. Nordhouse evaluated life in big cities with the index measure of economic welfare (MEW). This index is comprised of a citizen's free time, level of consumption and environmental conditions. The United Nations' Program for Development uses the index of human development. This also consists of three components: life-span, level of education, and level of personal consumption after, a purchasing power adjustment. From the given isolated instances, it follows that the process of development of industrial and post-industrial society, which has taken place in large cities and industrial regions - anthropogenic ecosystems - has resulted in a change of priorities. A transition from economic needs to environmental and psychological needs is currently taking place.

B.I.O. President, Agni Vlavianos-Arvanitis, believes that a new kind of indicator must connect profit with the level of pollution, education, public health, happiness, and wealth. This would result in a Quality of Life factor, as the focus of environmental problems. Environmental problems have to be recognised as a result of evolution and this is why a new kind of index is needed. I would, therefore, like to propose the following kind of non-cost index QL, consisting of two modular indexes:

$$\ln(\text{QL}) = \ln(k) + a \cdot \ln(\text{TL}) + b \cdot \ln(\text{Tf})$$

where k,a,b are proportion coefficients and degree

- TL - life-span: Life-span is defined among several demographic groups. It is closely correlated with environmental quality and nutrition. Life-span in the QL criterion reflects the human biological component.
- Tf - free time: Free time outlines the time remaining after physiological needs, work, social activity, and illness are completed. Free time is the time which a person can use for his/hers spiritual needs and for his/her self-realisation; it conditions a person's social comfort level.

Quality of Life does not equal the Standard of Life or the Level of Life. Every civilisation is limited in energy, information and material resources. We do not wish to replace other economics criteria by the QL index. This index combines both the traditional criteria of economic efficiency and the social criteria. With the help of such a system we can choose the process of environmental management in anthropogenic ecosystems as the best developmental strategy. The optimal system index has to be correlated with regional quality of life. Risk can be decreased if the system of economic criteria is supplemented with the QL criterion.

The chance to begin walking along this road will come when the system of environmental appreciation changes. It is necessary to consider Quality of Life, and not to consider the state of ecological systems. Quality of Life is reflected by the harmony between man and the environment. The stream of evolution will wash us aside, if harmony does not exist. That is why Quality of Life is a priority for achieving harmony between man and nature.

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