

ECOLOGICAL AND ECONOMICAL EVALUATION OF CONDITION OF ENVIRONMENT

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ABSTRACT

The worsening of societies' living conditions because of intensive exploitation of environment's elements amidst an accelerating scientific-technical progress is a realistic fact. Therefore the further utilization, protection and development of renewable and non renewable resources that is the management of environment needs an internationally coordinated activity. The basic problem of this activity is a thoroughgoing knowing the condition of environment which knowing should be of holistic access and based on human control submitted to autoregulation. All these can be realised by the application of global, regional and local monitoring information and evaluating systems compatible to each other.

The paper deals with theoretical and practical application possibilities of a method for ecological and economical model based on mechanism of operation of environment.

KEY WORDS: Global Monitoring, Non-renewable Resources, Renewable Resource

Recently the relationship between man and nature became an actual problem. It's a realistic fact, that living conditions of societies are continuously worsening due to the intensive utilization of the environmental elements. Therefore the forthcoming utilization of renewable and non-renewable resources, the development and protection of environment demand a better coordination between economy development and environmental protection as well as a uniform control in environmental utilization (Jakucs, Dévai, Précsényi, 1984).

So the development and protection of environment is an activity which is focused on meaningful organization of human-controlled production, distribution, turnover, consumption in the framework of existence and interaction of things, phenomena, processes in a system within the biosphere.

Utilization of regions is based on the operation of the given environmental system (biotic and abiotic products). Components of environmental system are operating mutually by their natural state interaction in autoregulated form. A human controlled environmental system is optimal if it corresponds to its natural state. The optimal operation is a basic society-, group- and individual interest. However, conflict is raised if over exploitation and environmental damages are caused by individuals or society groups in behalf of their present interests. In any branch of environment the optimal utilization can be realized only by means of long range planning and harvesting. In a given area the quality of environmental state is crucial for the welfare and existence of people living there.

It is essential that the environment's being kept in operation should be approached from a comprehensive aspect that contains the points of the whole system within the given territory or area. That's so because it isn't sure at all that summarizing the elements of an ecological problem we obtain the problem as a whole. In other words the expression of the whole with the sum of its parts in this case is uncertain. Thus come we to the conclusion that the system of interaction between living beings and their environment can only be described on the base of system analysis utilizing physical, chemical, biological, sociological and technical knowledge. The developing specific structure and function system change dynamically in space and time, while within the environmental system peculiar metabolism and

flow of energy take place. This process must be examined only like a comprehensive whole. That's why it's not correct to use the concept 'ecology' if we want to solve a partial problem. As we can read in the book of Juhász-Nagy, 1986: "Today almost everybody speaks about 'ecology' where yesterday would have told zoo- and phytogeography..."

Man must not oppose to the nature, like he could have lived independently of the environment. This fact unanimously shows the necessity of the environmental management. The material inventory of the earth is strongly restricted and nowadays almost 5 milliard people use it.

Man always loved nature, and as the first in high-class living beings, he tries to utilize the environment for himself. But recently we hear more and more about the pollution. Natural waters, particularly lakes and rivers and the atmosphere in many places are already polluted to such a degree, that the natural cleaning processes have suffered considerable deceleration. The entire biosphere is endangered, that is the whole area between the upper atmosphere and the depth of sea, wherein life exists. This hazard must be repulsed by man, if he wants to preserve life and human life primarily.

It must be born in mind, that first of all the habitat ensures the vital conditions for people. Of course it is expanding with human mobility, but basically the landscape and man living in it, are in dynamic interaction (Ghimessy, 1984).

A long series of suggestions can prove the necessity and actuality of environmental management. I think that from the foregoing we can see the national and international importance of this problem, but truly the sentences of Mr. Neil Armstrong express this, who opined about the earth when stepped on the Moon: "Our planet seems very small and remote. It's shocking how it looks like an oasis being lost in the world of stars, or a small island. And the most important fact, that we've understood: this small island is the only planet, which is suitable for human life. But I was staggered how small is the green color compared to the brown, more or less unyielding zones". (Grigorescu, 1976).

People can change the nature, turn back the rivers, transform the desert into oasis. But the most important question is the result of this

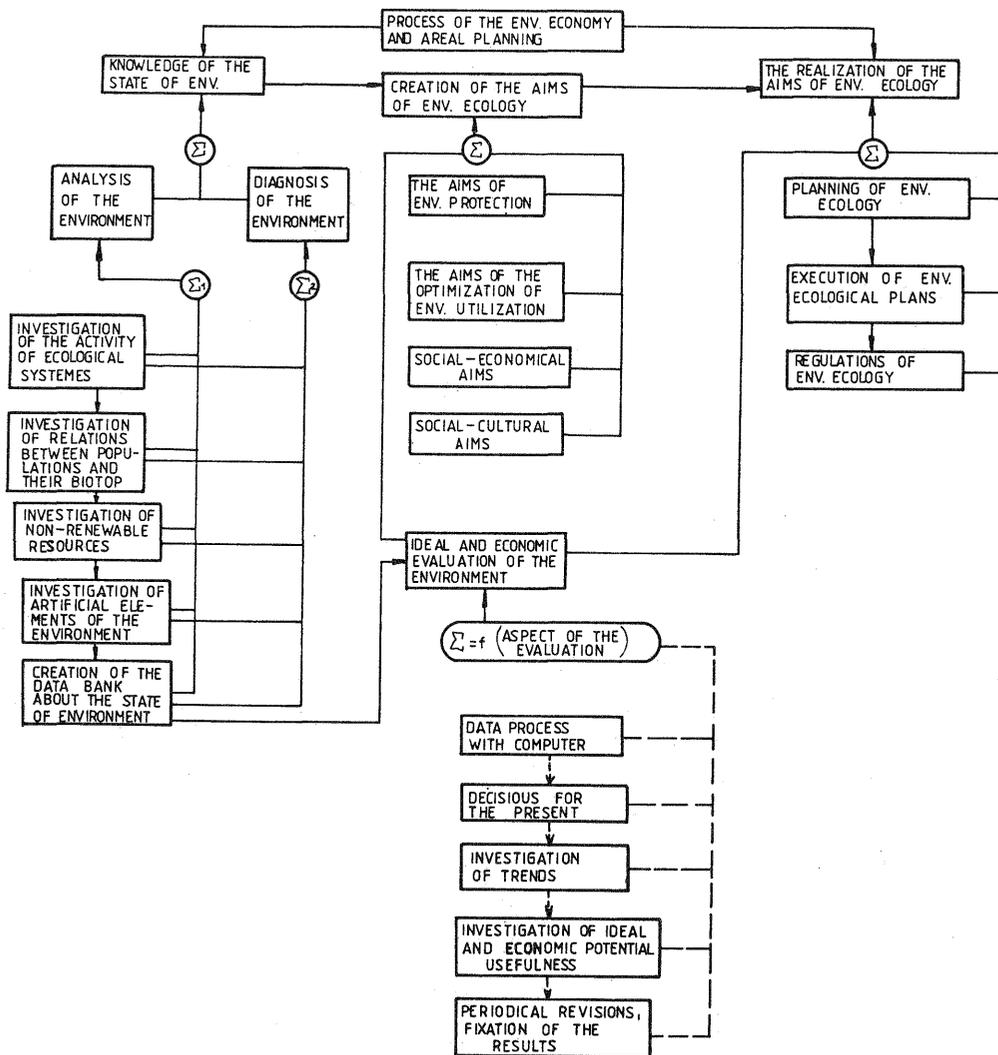


Figure 1.

MODEL OF THE PROCESS OF ENVIRONMENT PROTECTION AND DEVELOPMENT (Environmental economy)

transformation. It would be very useful to foresee all the aftermaths of these interventions. The biosphere-studying science can be the only real base for this comprehensive study. The words of Mr. Francis Bacon are really true here: "Natura enim non imperatur nisi parendo." (We can rule over the nature, if we subject ourselves to it.) And similarly with the words of the Russian writer Mr. Ivan Turgenev: "Nature isn't a church, but a workroom, where man can act as a simple worker." (Grigorescu, 1976).

The essential condition of the life is the systemic state-quality of the environment. The creation and survival of living beings depend mainly on the quality, state and change of the environment. The unfavorable processes can become demanding factors. The environmental protection is a conscious activity for changing these unfavorable processes. But the environmental utilization includes the positive transform and development of the environment too.

The relations between the environmental elements are dynamically mobile in time and space as a result of

external and internal effects. The situation of the moment shows the state of the environmental system.

The quality of the environmental state changes first of all as a result of the human activity. Man effects on the living beings and their biotope in two different ways: indirectly, as he changes the physical, chemical and biological conditions of the environment, and directly with his influence on living beings (e.g. deforestation, chemical processing, etc.). Man makes every effort to rise his living standards, but at the same time often endangers his own life. In historic eras people often left behind devastated lands, proofs of this destroying activity are the deserts of the earth. Where in our days are deserts, there used to be rich lands, but man changed the balance of nature with fire, pasturing or inappropriate agriculture. Man can invent any kind of insecticides, but never will be able to create a single lady bird!

The wandering stock breeder tribes scarcely disturbed the natural equilibrium of their habitat. The

agriculture already annihilated the plant species damaging for the people. These changes led to emergence of new ecosystems.

The concentration of people in industrial and commercial regions increased. Also increased the utilization of natural landscapes, and the claim to cultivable lands, since the number of populations have risen, too. Gradually began the structural reform of cultivated lands and the today's troubles are seated in it. The deforestation and establishment of monocultures motivated almost all the societies. Man only used his environment, and it was too late, when he realized, that can't correct the effects of these interventions. These can be moderated only with e.g. afforestations. The productivity of the environment depends on this human intervention.

The quantity and level of artificial elements are not the same in the different places of the earth. At the same time we can also say, that it makes its influence felt all over the world, and as the artificial elements have a lot of negative effects, they are determinative factors of the environmental state.

The pollution resistance of living beings mainly depends on their immunity. The connections between living beings and their biotope can be expressed usually with the functional level of populations. The adaptability or resistance of populations depend on the genetic structure and genetic variability of the given population. That's why it is very important to preserve the existing gene-stores. The populations have a common gene-store, which is characteristic of the population's vitality and of the environmental effects. The environmental effects of the genotypes are changing, and this is the base of the established phenotypes. The environment can modify the genotype and phenotype, too, practically may be an indicator in the given situation.

With the examination of the populations's genetic variations we can form a true notion of the biological function of the environmental state. That is the greater is the genetic variation of the population, the more probable is the possibility of the gene-recombination which makes possible the establishment of resistant genotypes. These genotypes can already live in a changed environment, or in other words the populations's tolerance is increasing. The overstressing of the environment makes the gene-erosion unavoidable which narrows down the variability of the population, the individuals either infiltrate to other populations, or they are crowded out of the ecosystem. This phenomenon endangers not only the populations, but the most valuable species of the biosphere inclusive of the mankind.

The next factors fundamentally influence the quality of the environmental state:

- air conditions and pollution factors
- water conditions and pollution aspects
- waste treatment and utilization
- noise emission.

Of course the mechanisms of this factors modify all the elements of the environmental system. Fig. 2. shows the effects of air pollutions on the vegetation.

Examining the effects of air pollutions on the forest, it's advisable to take into account the next factors:

- biochemical changes of living organisms
- changes in biomass-quantity

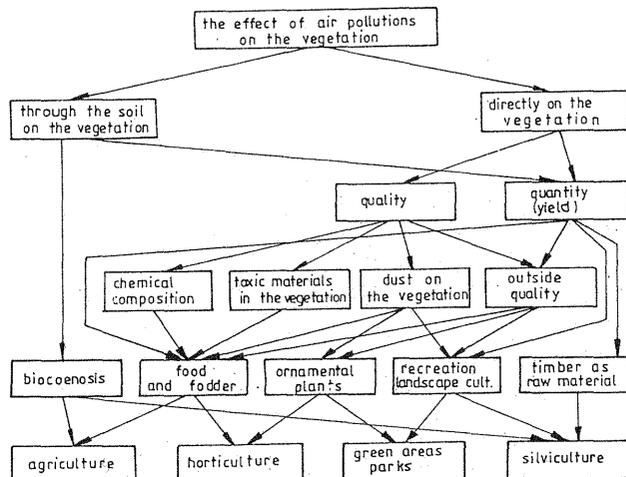


Figure 2. The effect of air pollutions on the vegetation (from H.G. Dässler)

- resistance
- mortality
- changes of populations and indicator individuals
- examination of produced symptoms.

The quality of environmental state can't be even estimated from quality of one element. A complex method is needed, which compares the effects, too. Fig. 3. shows such a model - it is the model of the environmental state.

The model may be suitable for examining the tolerance of forest against the environmental stress. The quality of the environmental state may be expressed on the base of autoregulation and tolerance of living organisms, with the characteristics and measured data resulted by the comparison of the certain territories. This autoregulation and tolerance can be measured on the global-, regional- and local-level environmental systems.

So the determination of the environmental state can be performed, and 5 categories of quality can be developed:

- I. overstable - very stable
- II. stable - above the threshold
- III. indifferent - transitory state
- IV. labile - unstable, changeable, under the threshold
- V. overlabile - collapsing.

These categories are segregated with the help of so called "biotop quality scores". Really these scores contain the measure of the autoregulation and the tolerance (against the environmental stress). The calculation method of these scores can't be presented here.

The above mentioned categories are applicable for the global, regional and local parts of environment, but this classification can be used for any parts of environment (e.g. landscapes), first of all for the agroecological and forestry regions.

These scores render help mainly for comparing the certain parts of environment, and inform us about the required improvements. With the computerized

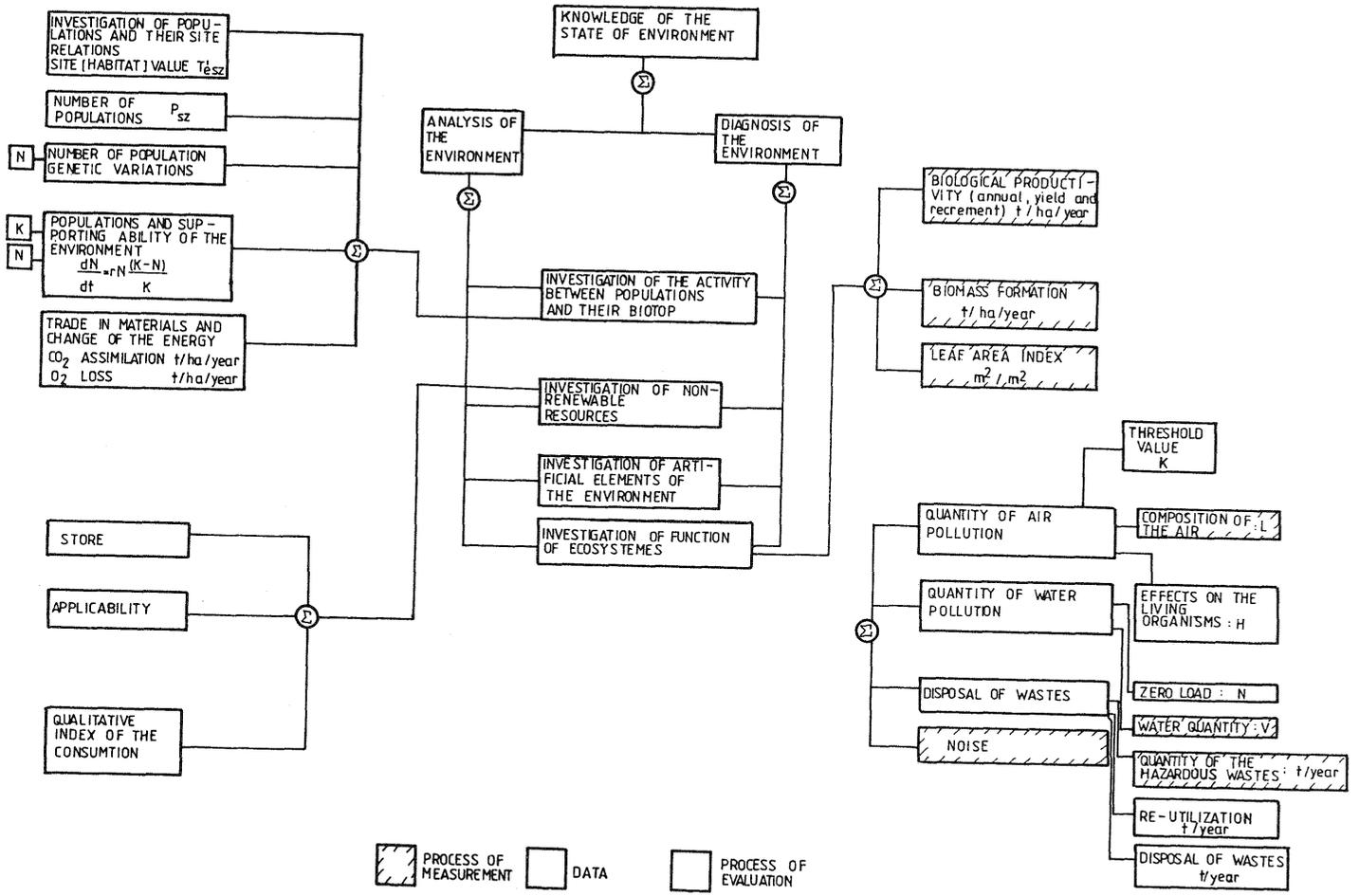


Figure 3.
MODEL OF THE STATE OF ENVIRONMENT

methods the scores establish the basis for planning, optimization and putting aims of the environmental management.

The quality and change of the environmental state show the function of the living beings (first of all the populations) of the given habitat. In other terms the more is the number of the species in the food-web, the more stable is the environmental system as regards its productivity and tolerance against the negative effects of the environment.

If the number of the populations is low on the biotop, the speed of the change of environmental state is accelerating. Relying upon these findings it's vindicable that forest is the stabilizer of a given environment since it is the ecosystem with the highest plants and the greatest number of populations. So it is very important to protect our environment with especial regard to the forest, because who protects the forest, protects the life.

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