



THE REFLECTIONS WITH REGARDS TO THE TRAGEDY OF THE TOXIC RED SLUDGE DISASTER OF AJKA

Judit Katona Németh, Rita Kendrovics Boda

Óbuda University Rejtő Sándor Faculty of Light Industry and Environmental Protection
Engineering

Doberdó út 6. H-1034 Budapest, Hungary

Abstract:

Qualifying the environment biologically and evaluating conditions ecologically might be the solution to avoid and prevent environmental disasters in some situations. The biological quality of an environment is defined as the condition reflecting the quantitative representation of living organisms in a given space and time. My lecture presents how to qualify the environment of a biocenosis synbiologically, in other words, on the supraindividual level. In this case, qualifying the environment in practice means that both the quantitative and qualitative composition of the biocenosis, and also the factors responsible for their distribution in space and time are considered and evaluated as characteristics. The ultimate goal of examining conditions is to evaluate, in other words, to determine relevancy and significance in a given biocenosis. We are facing the problem that in Hungary at present the biological survey methods are not standardized, and they are highly varied. An environmental information system however cannot function before appropriate methods of biological survey are created. The lack of such methods would result that one of the three major, organically complementary sources of information (i.e. the abiotic sphere, the biosphere, and human society) is completely missing. From a different aspect, ecological survey studies are different from the rest of environmental survey studies, inasmuch as they study living organisms and their communities, thus inevitably utilizing the results of other environmental survey studies that evaluate different components. This indicates that the ecological section of all environmental survey studies is vitally important due to its complexity, and should be considered primarily decisive.

Keywords:

the toxic red sludge, the quality of an environment, biologically qualified environment, ecologically evaluated conditions

1. How to determine the quality of an environment

Basically, there are two approaches. One makes the classifications based on certain indicators relevant to the method of utilization (e.g. the parameters of drinking water, industrial waste water, irrigation water, sewage water [3]), and the data is interpreted according to the appropriate range of standards. This approach is oversimplified, and consequently not quite operative. It is evident that a component of the environment does



possess a "quality" even if it is not utilized for any purpose. The concept of quality is not the same as the concept of expediency, (bonitas) or appropriateness.

The second approach evaluates the quality of an environment as the sum of all characteristics. This means the quality is not determined based on a single method selected, favoring one particular angle (such as temperature [1], light conditions, the level of phosphorus, etc.) If one wants to determine the actual quality of any given component of an environment, one cannot be limited to measuring such individual factors separately.

The quality junctions of a material system cannot be solely or even primarily characterized by the number and level of these elements, but rather by their specific structure, i.e. the particular interrelations of the components within the domain of the entire system. As opposed to the individual characteristics of a particular component, it is essentially more complex and complicated to interpret and analyze the totality of the specific characteristics created by their interrelations. Consequently, the quality of an environment can be defined as the condition determined by actual values measured in all of the characteristics of the given environment in a given time. The characteristics-complex that determines the quality of an environment has three basic components as follows:

- the abiotic sphere (the lithosphere, hydrosphere, and atmosphere comprising the glosphere [2])
- the biosphere (living organisms)
- the human society (noosphere).

In the area surrounding the red sludge reservoirs located near the towns Ajka, Almasfuzito and Mosonmagyaróvár, in addition to the established monitoring system, it could have been useful to observe and monitor any significant changes in the vegetation. In the flood zone beyond the dams of the red mud reservoirs, in addition to testing the PH level of the soil, regular monitoring and surveying of the specific distribution and changes in dominance of plant species could have indicated and warned about the presence of any seepage through.



Figure 1. The toxic red sludge

2. Biologically qualified environment

The biological quality of an environment is defined as the condition reflecting the quantitative representation of living organisms in a given space and time. The object of our examination can be a living being, a single individual, or a single part of an individual (e.g. an organ, a cell, a gene), or a single characteristic of the individual (e.g. its metabolism, its perception.) In the latter case, the biological environment qualification deals with the infraindividual, or "below" the individual level.

The object selected can be a population of a single species, or a group of populations. A population is an isolated group of individuals of the same species, existing together in space and time, thus creating an actual reproductive community. A group of different populations existing together in space and time is called a biocenosis.

My lecture presents environment qualification in a biocenosis synbiologically, i.e. on the supraindividual or "above" the individual level.

3. Characteristics of ecologically evaluated conditions

The research survey examines both the quantitative and qualitative composition of the biocenosis, and also the factors responsible for their distribution in space and time as characteristics: basic data, condition characteristics, and qualitative indicators are registered and analyzed.

Basic data: A list of species is compiled, summarizing the specific species involved in the given biocenosis. The quantitative characteristics are determined, such as the values of abundance, i.e. the number of individuals, and the values of dominance, i.e. the frequency and the size of the area covered.



Condition characteristics (Figure 2): The symbiotic relations, the number of species representing different levels of frequency, and the number of individuals are determined, the dominant and characteristic species are distinguished.

The status of designated nature conservation area, and diversity (Figure 3) can be considered as qualitative indicators. Diversity is increased by the variety of environmental factors, and the relative stability of living conditions. The main advantage of diversity is to provide genetical variety. The more genetically different the living organisms are in a given area, the more increased the probability is that several species will be able to adapt to any potential environmental changes, thus avoiding the extinction of the flora (plants) and fauna (animals) of the given area.



Figure 2. Condition characteristics are registered and analyzed

The survey of ecological effects can be divided into three successive phases [4].

- In the first phase, the ecological quality and condition of the given area is evaluated.
- In the second phase, the potential environmental changes that might be created by a given land development project must be analyzed as relevant to the biosphere.



- In the third phase, the operations of the completed project must be monitored, and the results of observations and measurements taken must be continuously evaluated and analyzed.

In the area surrounding red mud reservoirs, potential seepage through can result in increased alkalinity of the soil, thus changing the diversity of plant species found in the area. There is only a relatively small group of plants capable of adapting to a highly alkaline environment, so the ecological information provided by bioindicators would significantly complement the results obtained by instrumental monitoring systems.



Figure 3. Qualitative indicator is diversity

Conclusions

- Qualifying the environment biologically and evaluating conditions ecologically might be the solution to avoid and prevent environmental disasters in some situations.
- Ecological survey studies are different from the rest of environmental survey studies, inasmuch as they study living organisms and their communities, thus inevitably utilizing the results of other environmental survey studies that evaluate different components. This indicates that the ecological section of all



environmental survey studies is vitally important due to its complexity, and should be considered primarily decisive.

References:

- [1] DOBÓ, E. – FEKETE-FARKAS, M.-KUMAR SINGH, M.-SZŰCS, I.: Ecological-economic analysis of climate change on food system and agricultural vulnerability: a brief overview. *Cereal Research Communications*, 2006, Vol. 34. No.1, pp.777-781.
- [2] MIKULEC, V. -STEHLOVÁ, K. Application of the climate change scenarios on selected meteorological characteristics for the purposes of water content prognosis in time horizons 2010, 2030 and 2075. *Cereal Research Communications*, 2006, Vol. 34. No.1 pp.45-49.
- [3] NÉMETHNÉ KATONA, J. *The Biological Foundations of Environmentalism Publisher*. 2003, Budapest, pp. 180-335.
- [4] RÉDEY, Á. – MODI, M. – TAMASKA,: *Evaluating Environmental Conditions Publisher Veszprém University* 2002, pp. 24-37.

Corresponding address:

Judit KATONA NÉMETH

Institution Rejto Sandor Faculty of Light Industry and Environmental Protection Engineering Faculty

Óbuda University

H-1034, Budapest doberdó út 6.

Phone: 361-666-5943 fax: 361-666-5909 e-mail: katona.judit@rkk.uni-obuda.hu