Environmental Space (Ecological Problems)

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Abstract

In connection with the critical ecological situation in the region (Ukraine) it is necessary to work out a complex approach to the assessment and normalization. One of the most aspects of this is a landscape geochemical and medical ecological analysis.

Bukovinian region has been taken as a model for the development of scientific and methodological principles of the analysis due to the predomination of the anthropogenious and celitebious landscapes.

To evaluate the environment, the author of the article has worked out the methodology of calculating the integral figure of ecological danger. The use of the suggested formula gives us an opportunity to consider the ecological value of the nature components (translocational figure of danger) and the synergetic action of their elements. The integral figure can be taken as a normative, because it provides us with the possibility to figure out the utmost extent of environmental pollution, above which certain biochemical reactions take place (among them various diseases such as allopetia and others).

In the present work the author generalized the results of landscape studies (starting from 1980), stressing upon their use within human ecology. The problem that the author tried to work out in the research process was the elaboration of the methodological and theoretical theses as will as of the principles of ecological analysis concerning natural and anthropic entities. This analysis will be used in the study of the region's ecological situation and in finding a situation to the problem of nature use and health case.

The opportunity of the problem

In his practical activity oriented towards the satisfaction of material needs, the human being has often interfered in the course of the natural processes which has lead to profound changes, sometimes irreversible disturbing the reciprocal ties between the component and natural phenomena, exerting a certain pressure upon the ecological situation. Because of this activity, there appeared anthropic elements of the landscape medium characterized by certain geochemical, geophysical, structural and functional particularities (and others, as will). V. I. Vernadschi (1965) discovered the essence of nature transformation due to anthropic influence and showed that the problem of this influence was a geochemical and biogeochemical one.

Today, ecological problems have a global character and in certain regions in Ukraine they present a catastrophic character as they endanger people's life and health. The intense pollution of the medium caused a great number of negative consequences in different fields of man's life and activity: they changed the figures of human life, morbidity increased and they bead to the loss of the waters chemical capacities. These waters are used for living and technical purposes.

One of the natural objectives that have suffered a considerable anthropic influence (including radioactivity) after the explosion at CAE Chernobyl is the western part of Ukraine. In Chernivtsy, au extreme situation (1988-1989) contributed to the apparition and development of a disease specific to children called " exogenous intoxication" (total and partial allopetia). The degree of urban and rural intoxication increased

significantly. It has been confirmed that 80% of the malignant tumors appear under the influence of unfavorable factors in the environment.

Referring to the critical state of the ecological situation in the region, we strongly feel the need for complex measures meant to tower these issues. We ought to take into consideration the present characteristics of geochemical ecology, which could permit the transfer, at the landscape level, regarding the approach of certain important anthropoecological and medical geography tasks.

One of the perspective approaches is the ecological analysis of the landscape whose object of analysis at stresses upon the situation created owing to the interaction between the human being and landscape. Usually, such an analysis is, to a certain extent, the geochemical one and also the medical and ecological ones and thus it refers to the habitable landscape because it is in them where we notice the greatest influence upon the medium, which has a negative impact on health. Anthropic landscapes need a real geochemical and geoecological analysis followed by the forecasting of the existing conditions.

The tasks of ecological and geochemical analysis can be divided into general and special ones. General tasks are those which refer to the geochemical landscape structures (both local and regional). This fact has a major importance in determining and evaluating the geochemical and technogen anomalies. Special tasks are directly linked to the thorough study of anomalies and specific situations connected with these. Regarding the content, they are closer the practical problems.

Taking into consideration the character of the problems, special tasks themselves can be divided into their groups:

a) problems liked to the discovery and characterization of abnormal structures belonging to the geochemical landscape (especially the urban landscape);

b) problems referring to the evaluation of the ecological state and the ecological and medical analysis of geochemical landscape systems (these problems are closely connected with medical Geography);

c) problems connected with the rational use and protection of the environment (the environment being seen from a geochemical point of view). On the present work the author used the general tasks mentioned above and the first two groups belonging to the special tasks.

The content and the purpose of the mentioned task determiner the volume and the character of the geochemical landscape information as well as of the medical and geographical ones. In order to solve these problems it is necessary to elaborate the principles and the methodological bases meant to provide an ecological evaluation of the anthropic landscapes and their components, their morphological systems and also the theories to control, conduct and improve the qualities of landscapes.

The elaboration of these concepts was made on the basis of a special example dealing with the basin landscape situated in Chernivtsi and the northern part of Republic of Moldavia. In these regions, the change of different types (subtypes) and classes of landscape occur but on relatively small areas. Thus, mountainous forests, forestry meadows, forest steppes and grasslands that appear in areas dominated by plains, suffer certain typical anthropic alterations. Some geochemical figures characterizing the landscapes of this region were evidentiated for the first time. At the same time, an ecological evaluation of the anthropic landscapes of the region was made. The evaluation was from the point of view of medical Geography.

The methodic and methodological base

The methodic and methodological base consists of important principles, starting points, laws elaborated by native and foreign geochemists and specialists preoccupied with landscape problems and nature protection (V. I. Vernadschi, M. A. Glazovschi, V. V. Dobrivolschi, K. N. Diaconov, A. G. Isacenco, I. A. Izraeli, A. M. Casimov, A. A. Crauclis, V. k. Lucasov, O. M. Marinici, G. G. Miller, F. N. Milcov, V. A. Nicolaev, O. I. Perelman, V. S. Preobrajenschi G. B. Pauliukeaviceos, E. Iu. Saet, M. A. Solntev, V. A. Soseva, V. A. Snitco, I. I. Svebs, L. N. Sevcenco, P. G. Sisenco, etc).

The medical and geographical aspects of the investigations were examined according to the papers signed by A. T. Avtsin, T. M. Beleacova, E. I. Ignatev, V. M. Misenco, B. B. Prohorov, E. L. Raih, E. S. Feldman,V. A. Sevcenco, A. A. Sosin. The figures used in the process of map drawing (for nozogeographycal forms) are represented by the intensive and standardized figures expressing morbidity and mortality.

The methodical approach used in the geochemical and ecological investigation of urban landscapes (the town of Chernivtsi and others) and the estimation of geochemical anomalies are based on the use of concepts in the ecological studies of towns: the atmospheric medium (the atmospheric rainfall, snow, dust), the water circuit in town (the problem of water purification and superficial flow), the sedimentary medium (depth deposits, soil, vegetation, micro-organisms, urban population).

Based on the existent ideas and attitudes, except for the anthropic studies of landscapes

(starting from 1988), the author has also been involved in geochemical and ecological studies of the habitable geosystems of the region and the results are presented in another work.

There are some factors that helped the discovery and the study of the ecological functions of anthropic landscapes. These factors were partially elaborated by the author. We can mention the scientific approaches and the methods of Geochemical Landscape Ecology (is a special chapter integrated into Landscape Ecology). Geochemical Landscape Ecology deals with problems such as the organisms conditions of activity (man included) in direct connection with the landscape and with the participation of chemical elements. Medical and Geochemical Ecology (or Geochemical Landscape of Man) illustrates the presentation of the same life conditions but taking into consideration their influence upon people.

An important methodological feature of Geochemical Landscape Ecology represents the study of the opposite parts of the chemical element migration – their concentration and dispersion. It has become the most significant factor in the fight against pollution that "suffocates" the environment. Within the landscape, the chemical elements indicate the impurifying substances, which provide the possibility of discovering the source of pollution and their influential areas. It is also possible to follow the interaction between the natural media and to estimate the anthropic influence upon living organisms.

Another function of Geochemical Landscape Ecology resides in the study of biogeochemical influence of the geochemical components consequences of activity (particularly of technogen origin) upon living organism (man included). It also studies the reaction of the organisms to the mentioned influence (the state of health) and their adaptability. Except for this, the level of influence of some components upon nature gives the opportunity to establish the permissible efficiency level on landscape and the maintenance of the best ecological situation.

Elaborating the methodical criteria of ecological evaluation regarding the geochemical particularities of the landscape, the author introduced and used notions such as "the technogen geochemical field", "the elementary technogen landscape", "the geochemical and ecological situation", "geoecological site (ecotop)", etc, which in the respective work obtained the respective characteristics.

The difficulties that appear during the investigation are the result of the lack of theoretical theses, highly significant in the study of the relationships between man and nature. We can mention here the standardization, the geoecological evaluation, forecasting etc.

The determination of the danger represented by pollution that affects the landscape by means of chemical substances

From a hygienically point of view, the danger of landscape pollution is determined by the level of negative influence exerted by pollution upon the environment. Pollution comes into direct contact with the air, water, soils food and man. The fundamental criterion in the hygienically evaluation of the danger given by pollution is the maximum permissible concentration of chemical substances present in the components of the landscape (CMA). This figure is a quantitative one. In order to manifests upon the element's coefficient of danger (K_P). This represents the ratio between the quantity of the substance in the landscape component (the quantity of substance which is analyzed) and its maximum permissible quantity ($K_P=C_i/CMA$). In order to evaluate the ecological situation it is also used the pollution intensity figure characterizing the natural component (P_j) and an integral figure of ecological danger of the landscape (in conventional unites).

$$P_j = \sum_{i=1}^{n} M_i K_{C_{ij}} I_p = \sum_{j=1}^{m} P_j T_j$$

or

$$I_p = \sum_{j=1}^{m} T_j \left(\sum_{i=1}^{n} K_{Ci} M_i\right)$$

T_j - the translocation speed figure in conventional unites (for soil – 2; air – 3; phreatic waters – 4; biomass – 5); K_C – the concentration coefficient of the chemical elements; M – the value of danger figure of the chemical element (the negative character). The class of danger – above 4.1 – first class; 2.6 – 4 – 2rd class; 0.5 – 2.5 – 3rd class; less then 0.5 – 4rd class; n – the number of chemical elements that are taken into consideration (P_j and I_p are important in the evaluation of the ecological situation).

The use of the above formula gives the possibility of including the ecological importance of the landscape components and the synergic action of chemical elements characteristic to them

(the people's lives and health conditions). The landscapes situated in the central part of Chernivtsi are characterized by a high degree of danger (I_P = 70.8). This fact confirms the conclusion referring to the ecological tension and the necessity of adopting some measures meant to improve the hygienically conditions of the respective urban territories.

Therefore, in evaluating the ecological situation, v most important factor is the integral danger figure of the ecological situation specific to the landscape. This is based on the analysis and on the some of partial figures that express the anthropic influence. This analysis takes into consideration the translocation figure with its harmful character, the ecological importance of landscape components and the synergic action of the elements. It is necessary there to obtain "the double complex noms" which include, on the one hand, the systemic character of the proper landscapes and on the other hand a big number and partials the complexity of the influential elements.

Given the conjugated analysis of technogen pollution figures and ecological danger, it is possible to make the evaluation of the landscape's medical and ecological situation. Regional ecological landscape investigations allowed us analyze each nozologic unit medical factor, taking into consideration the environmental factors that they depend on (the composition of microelements, the alkaline and acid conditions, oxidoreduction conditions, the degree of technogen pollution and self-purification). Its it was proved, rural morbidity within the grasslands characteristic to calcions steppes is bigger than in the case of acid forests grasslands (taking into consideration both intensive and standardized figures).

The integral ecological danger figure of the given landscape can be considered a critical one. A higher value (I_n = 50) of this figure can lead to the appearance of some negative reactions of the human organism, including illness. This figure is a normative one but it can also help forecast other medical and ecological situations of the urban territories situated in different regions.

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