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CONTRIBUTION TO THE ENVIRONMENTAL REGIONALISATION OF SLOVAKIA

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Abstract: In this paper is analysed approach and basic information sources according to particular components of the environment that are needed for updating of environmental regionalisation of Slovakia. The syntheses led to delimitation of 9 areas with strongly affected environment. The analysis of spatial distribution of mentioned areas, in relation to basic regions as they demarcated Lukniš (1985), is presented in conclusion.

Key words: environment, environmental regionalisation, water and air pollution, contamination, threatened areas

1. INTRODUCTION

Environmental regionalisation of Slovakia used in first half of the 90's leaned on the pre-transition data as they were taken over from the Atlas of environment and population's health condition of the Czecho-Slovak Federal Republic (Brno, 1992).

Regarding the dynamics of the changes in the Slovak society in the first half of the 90's, which found reflection also in environment in the regions of Slovakia, it was necessary to up-date its environmental regionalisation.

Co-ordinator of this task was the Slovak Environmental Agency in collaboration with the institutes of the Slovak Academy of Sciences, universities, Ministry of Environment and other specialised centres.

2. ANALYSES

Evaluation leaned only on such environmental indicators, which can be interpreted for the whole territory of the country. Discussions of experts concerning the single environmental components and the risk factors were the source material.

The key tasks:

- Identification of the key and available data for the assessment of environmental loads, which influence the given environmental component and/or identification of the rate of negative effects of a chosen risk factor at national level;
- Classification of the single types of loads of territory drawing isolines of the pollutants (air).

In case, if there is no database available for the construction of isolines the environmental component will be classified into one of five classes:

1st class: state of environment with the least man impact, the nearest to the ideal of ecological balance of nature;

3rd class: medium degree of negative impact on the environment

5th class: extremely affected environment by man impact with the highest share of environmental loads.

The second and the fourth classes express the transitory stages between the first and the fifth classes towards the middle of the set under identification.

- To focus on indicators, which make possible to reflect the existing state of the environment or the rate of threat;
- Map presentation of the conclusions.

While processing the environmental regionalisation of Slovakia, the anthropocentric approach was emphasised. Man disturbs the landscape structure with his activities, he creates environmental loads but he is also the decisive addressee of the negative feedback of the damaged environment in the afflicted regions.

Air and water were the main factors of the environmental characteristics studied.

Distribution of the pollutants emitted into air was processed in a form of mathematical model using calculation of air pollution by stationary sources with aligned long-term wind rose typical for the particular region. Natural character of surface and underground waters is primarily defined by the geological structure of a collector and the drainage area. The water quality is secondarily influenced by man impact. Pollution enters the surface and underground waters from point and sheet pollution sources.

While analysing factors of geological situation the interaction of the following layers were evaluated:

1. Rocks, mineral deposits, seizmicity, natural radioactivity and
2. Ongoing relief forming processes such as slope's deformities, erosion, weathering, and eolian activity.

The spatial representation of the evaluated phenomena made possible to classify the Slovakia's territory into four classes:

1. high level environment
2. satisfactory environment
3. impaired environment
4. severely up to extremely impaired environment.

High level and satisfactory environment correspond to about 80% of the territory of Slovakia. Great part of disturbed environment (the 3rd category) is represented by landslide areas in the neo-volcanic mountain ranges of the central and eastern Slovakia and in the flysh mountain ranges of the northern Slovakia. Part of the areas classified into the third category and the majority of the areas of the fourth category (severely to extremely disturbed environment) is represented by the areas with the principal mineral deposits of the Slovak Republic: the region of upper Nitra, central and eastern Slovakian neo-volcanites, Spišsko-gemerské rudohorie Mts., the area of Modrý Kameň and other. Negative anomalies in the areas of the 3rd and 4th categories in the western, northern, and eastern Slovakia are also caused by their seismic activity.

The map "Contamination of the soils of the SR" (V. Linkeš et al. 1996) shows that high-risk or even intoxicated areas of soil contamination are practically identical with the threatened areas of Slovakia remarkable for high emission load past or present. They are the areas with negative impact on man and environment calling for remedy. Extremely contaminated soils are in the region of central Spiš, the area of Jelšava-Lubeník (extraction and processing of magnesite).

Spatial differentiation of risk areas of the first degree with possible negative impact on man and environment containing at least one soil pollutant is interesting. They cover extensive areas of mountains and elevated positions of the north-western and northern Slovakia: The Biele Karpaty Mts., Javorníky Mts., Malá Fatra Mts., Kysucké and Oravské Beskydy Mts., Západné and Vysoké Tatry Mts., and Spišská Magura Mts., suggesting that it is caused by long-distance transfer of pollutants from the Czech Republic and Poland.

The mentioned degree of contamination occurs also in Veľká Fatra Mts., Nízke Tatry Mts., Slovenské Rudohorie Mts., northern part of the Danube Lowland, and north and south of the East Slovakian Lowland. In this case, combined effects cause it.

For the study of vegetation and wildlife, the results of forest monitoring in the territory of Slovakia were used as the main indicator, namely the index of forest defoliation. This indicator was the exemption to the rule that in environmental regionalisation of Slovak only the sources interpretable for the whole territory of the country would be used. This was the reason why this indicator was used as an auxiliary one.

From the point of view of identification of environmental loads of territory it is necessary to analyse also the wastes as a risk factor, a potential hazard for the environmental components associated with dumping, transports, processing and treatment of wastes.

The issue of wastes in environmental regionalisation is complex, as the very origin of wastes does not necessarily have to mean the direct threat for the environment. Apart from that, no reliable database on waste dumping sites is available. For the overall (national) comparison of the territorial load represented by the wastes we used the data obtained by monitoring the waste origin processes for the districts of Slovakia and especially the data on production of dangerous wastes (Lacuška in Bohuš, 1998).

Emission load produced by traffic and environmental risk associated with dangerous waste transport were expressed using the motor way maps, high speed communications and the 1st class state roads in territory of Slovakia as an analytical source which spatially identifies the quoted problems.

3. SYNTHESES

Environmental region represents a typical multi-component region. Authors of environmental regionalisation faced a difficult task: an adequate selection of elements (components) and assessment of their weight in the given task. Cartographic method of map overlay was chosen as the most suitable one. Gradual assessment of the contents of these analytical maps resulted in delimitation of the regions with desired degree of unification of various environmental characteristics. The level of air and water purity was used as the basic environmental characteristics of the region (Bohuš P., 1998). By the first step of the synthesis, the assessment of the state of the mentioned environmental components, we attributed higher weight to them as compared to the rest. However, mutual synthesis of all air characteristics and the mutual synthesis of the surface and underground waters preceded it.

Three grades were used to express air pollution: 0 - territory free from special load, 1 - elevated concentration of pollutants in air or occurrence of one or two pollutants, 2 - high concentration of pollutants or occurrence of several pollutants.

Water pollution was expressed by scale of I. - the best to V. - the worst quality grade in the sense of threat for surface and underground waters. A map projecting air and water pollution was composed. Spatial differentiation of the two most important environmental indicators shows that the worst situation is in the following areas: Bratislava and its immediate hinterland, Galanta - Šaľa, Prievidza - Partizánske - Topoľčany, Zvolen, Rimavská Sobota, Revúca, Rožňava, Spišská Nová Ves - Gelnica, Košice and its environs, Vranov nad Topľou-Trebišov-Michalovce.

In order to achieve a comprehensive synthesis the next step had to be the assessment of the source information on base rock, soil, biology and wastes. Partial synthesis was carried out also for the individual groups of environmental components and risk factors.

The knowledge obtained from the partial synthesis was used as supplementing information on environmental load in the territory. It was used as supplementing information because the environmental indicators of soil contamination and defoliation of broad-leaved wood species alone express to considerable extent the already assessed characteristics of air and water pollution. The rock component influences such environmental load which is given by the natural conditions of the particular territory, such as the geochemistry of the rocks, natural radon occurrence, landslides - with a minimum share of man impact. Adding the knowledge drawn from the partial synthesis to the source map of air and water pollution, we obtained further differentiation of the territory of Slovakia. If the supplementing factors of assessment on the load areas concentrated in the 1st and 2nd quality degree, their scope had to spread over adequately to the added environmental load.

In case of high environmental load, parts of the territories in the 1st and 2nd quality degree had to be shifted to the areas with the worst pollution grade. This was how the above-mentioned areas classified into the worst pollution class were broadened by addition of parts of the districts of Žilina, Ružomberok, Žiar nad Hronom and to the space around Spišská Nová Ves-Gelnica the area of Krompachy was added.

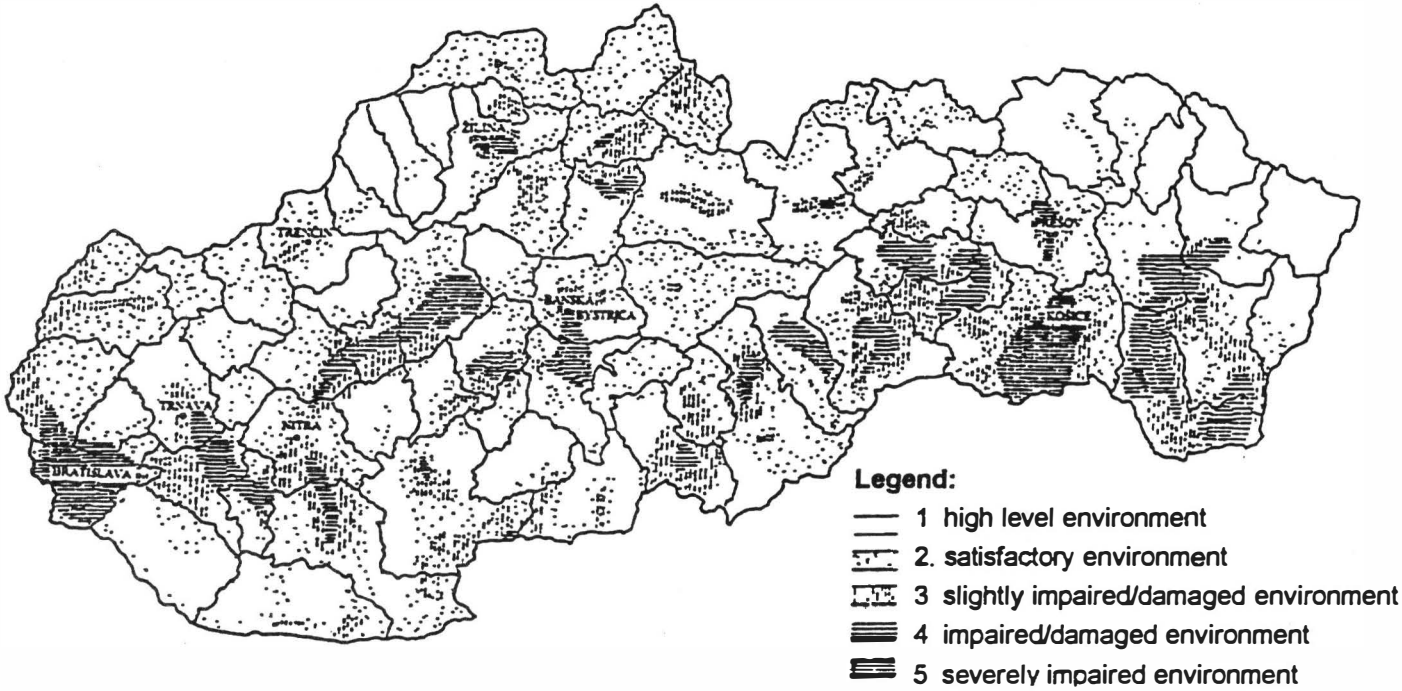
The map of environmental regionalisation of Slovakia (enclosure 1) presents the level of the environment of the Slovak Republic as classified into five classes:

1. high level environment,
2. satisfactory environment,
3. slightly impaired environment,
4. impaired environment,
5. severely impaired environment.

The map does not imply any reliable conclusions on qualitative changes of the state of the environment in individual regions of the Slovak Republic for the last decade. It is caused by the fact that in the previous attempts of the environmental regionalisation partially different input source material was used, while also the method of synthesis of the individual environmental indicators were different.

The development in the last decade though, suggests certain trends in the qualitative changes of environmental situation in Slovakia. The most important one concerns the overall diminishing of the area of the Slovak Republic classified as severely or extremely impaired environment (classes 4 and 5). The situation improved in the drainage area of the Slaná, in Žiarska kotlina basin, central Pohronie and central Považie regions, the area of Žitný ostrov, Galanta-Šala in the consequence of implemented measures aiming at improvement of the environment and closing down of some harmful industrial plants.

Recently industrialised areas in the northern and western parts of Slovakia do not belong to the category of the high level environment (1st class) any more. Increased rate of soil contamination and defoliation of broad-leaved wood species is quite evident there. It was caused by the long-distance transfer of pollutants from the regions of Ostrava and Silesia in the Czech Republic and Poland.



Map 1 Level of the environment in the Slovak Republic

Synthesis of environmental loads resulted in newly demarcated areas with impaired level of the environment in the districts of Trebišov, Rožňava, Topoľčany and basin of the Morava.

The overall situation in the territorial differentiation of the level of the environment did not substantially change in the nineties. In addition, the contemporary environmental regionalisation recognises nine areas with severely or extremely impaired environment (classes 4 and 5): Bratislava with its hinterland, Galanta-Šaľa, upper Ponitrie, central Pohronie, central Považie, central Spiš, central Gemer, the city of Košice with its hinterland, central and southern Zemplín.

Spatial distribution of the areas with severely or extremely impaired environment is interesting in its relation to the basic regions of the Slovak Republic (Map 2) detailed by M. Lukniš (1985). He divided the territory of Slovakia to four regions pursuing the criteria of typological division as follows:

1. West Slovakian centralisation region,
2. East Slovakian centralisation region,
3. North Slovakian corridor region,
4. South Slovakian corridor region.

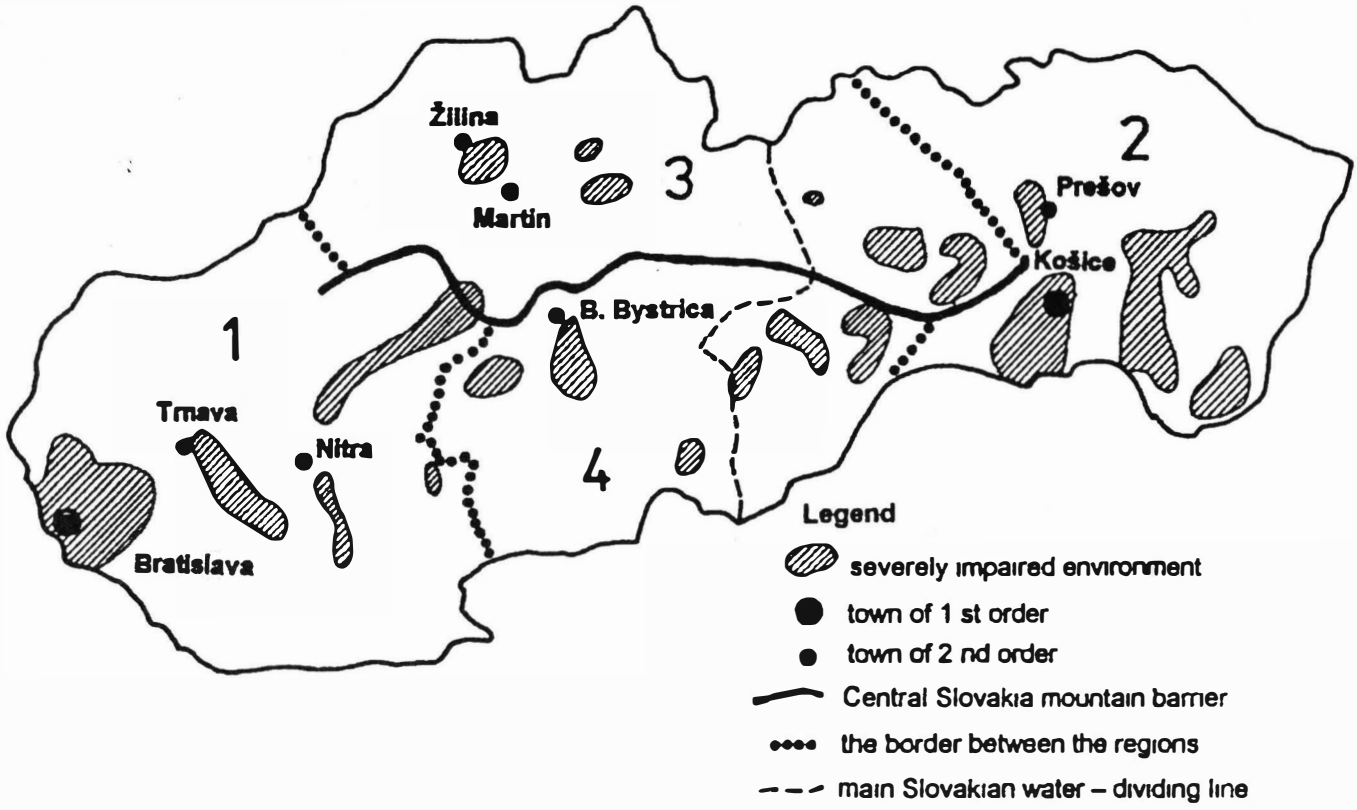
The West Slovakian centralisation region is the largest one (32.3% of the total area of the SR) and it is inhabited by 44% of total population of Slovakia. Its core space consists of extensive plains on alluvial plains of big rivers and loess boards or hilly lands of the Danube lowland. It comprises three extensive areas with impaired up to severely impaired environment: Bratislava and its hinterland, Galanta-Šaľa and the region of upper Nitra.

The East Slovakian centralisation region occupies 22.6% of the area of Slovakia and it is inhabited by 20.7% of Slovakia's population. Its core space is the East Slovakian lowland and the Košická kotlina basin. In its core space there are two most extensive areas with severely impaired environment: Košice and hinterland, central and southern Zemplín regions.

The W-E oriented Central Slovakian barrier divides the area of the Carpathians between the centralisation regions in the west and east into two isolated parts: the North Slovakian corridor region and the South Slovakian corridor region. Its core space consists of basins and valleys of major W-E oriented rivers, which possess higher primary potential of connecting both of centralisation regions across the dome of the Carpathians.

In the North Slovakian corridor region, there are two smaller areas with severely impaired environment on its western fringe around Žilina and Ružomberok and near the eastern fringe in the area of the central Spiš region. In the South Slovakia corridor region is the area of central Gemer and central Pohronie.

The above quoted implicates that there are two major areas with severely impaired environment in the core spaces of basic regions in lowlands and basins. These are the ones with the highest primary potential and inhabited by 75% of the total population of Slovakia.



Map 2 Regions of the Slovak Republic and environment

4. CONCLUSION

Environmental regionalisation of Slovakia is a permanent and topical task. More precise identification of parameters in nine threatened areas of Slovakia, above all changes in their surface area, number of population exposed to environmental load and identification of the origin of the environmental load are desirable.

New source material for demarcation of the threatened areas from the point of view of the environment will have to be prepared. Identification of the key environmental problems of the SR and the corresponding solutions are indispensable. An important task for the experts and involved institutions is also to press on entities producing environmental load in the areas above the level acceptable for sustainable development.

Moreover, the last but not the least is the social aspect. Environmental regionalisation provides the population reliable information on the environment they live in.

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Resume

K problematike environmentálnej regionalizácie Slovenska.

V prvej polovici 90-tych rokov používaná environmentálna regionalizácia Slovenska (ERS) vychádzala z údajov z predtransformačného obdobia. Dynamické zmeny v slovenskej spoločnosti v 90-tych rokoch sa prejavili i v stave životného prostredia v regiónoch Slovenska. Vyvolali potrebu aktualizácie ERS.

Ku kľúčovým úlohám aktualizácie patria:

- identifikácia kľúčových a disponibilných dát pre zhodnotenie environmentálnych záťaží v celoslovenskom meradle,
- triedenie zaťaženosti území formu izolínií výskytu znečisťujúcich látok (ovzdušie),