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LANDSCAPE-ECOLOGICAL PLAN - AS BASIC TOOL FOR SUSTAINABLE LAND USE THE SLOVAK EXPERIENCE

Introduction

In Slovakia, there are two basic landscape-ecological tools, which regulate sustainable land-use of the territory:

- territorial system of ecological stability,
- landscape ecological plan.

These documents serve as an inevitable part of all territorial-planning documentation. In Slovakia, where elaborated new methodological procedures for elaboration of these documents in Year 2000. The main principles of the these documents are:

- protection of the nature, biodiversity, stability,
- protection of the natural and cultural-historical resources,
- protection of the environment.

Theoretical-methodical procedure

Territorial system of ecological stability (TSES) represents the whole-scale structure of mutually linked ecosystems, their parts and elements; it ensures the sustainability of life forms and life conditions in the landscape and, at the same time, it creates the conditions for the sustainable development of landscape. The main result of this documentation is proposals of the TSES framework: the network of biocentres and biocorridors. The system of measures leading to an ecologically optimum organization and utilization of landscape is also an inevitable part of TSES.

Landscape-ecological plan -its goal is to create an ecologically optimum functional and spatial structure of the territory. This structure generates such kind of the natural-social territorial system that is able to harmonize the demands of the socio-economic development with the needs for the protection of nature, natural resources and the environment. The basic aim of the evaluation of the present functional and spatial use of the territory is to define those landscape-ecologically problematic areas in which the present land use does not correspond with landscape-ecological criteria. In other words, to identify the areas where the present land use is restricted by some of the landscape-ecological regulative. The aim of the newly proposed, ecologically optimum use of the territory is to eliminate these problem are-as, to foresee possible new problems and thus to create a spatial structure which is in harmony with the natural and socio-economic conditions of the territory. The basic results of the landscape-ecological plan are:

- alternative landscape-ecological proposal - represents proposal of these activities, which is possible realise on the territory. It is an answer on the questions:
 - What activity is possible realised on the given area?
 - What activity is not possible realised on the given area?
 - What limits and restrictions exclude particular activities from area?
- optimal landscape-ecological proposal - is aimed at the proposal of this activity, which is the most suitable for this territory.

The basic goals of these documents are:

- to identify of the landscape-ecological problems of the territory,
- to eliminate these problems,
- to foresee possible new problems,
- to create a spatial structure which is in harmony with the natural and socio-economic conditions of the territory - ecologization of the spatial organisation of the landscape.

Ecologization of the spatial organization of the landscape is process aimed at the ecologically optimum spatial organization, utilization and protection of landscape which results to the proposal of most suitable localisation of demanded human activities within the given territory (where?) and successively to the proposal of necessary measurements ensuring the ecologically proper functioning of those activities on the given locality (how?). It is a method for to answer the questions where and how to provide human activities in the territory that would be in least contradiction to natural conditions (Ružička, Miklós, 1982). The central conception of process ecologization is based on the understanding of the landscape as complex natural resources. The core of the evaluation is the decision-making process based on the confrontation and successive proposal of the way of harmonization of the:

- complex of the properties of the landscape as a complex natural resources on the one side, with the
- demands and influences of human activities on those properties on the other side.

Main time-object stages of the evaluation are as (Miklós, 1986):

- 1st. stage: spatial-organizational - where: the optimum spatial-functional arrangement of the territory,



Steps	Territorial system of ecological stability	Landscape-ecological plan
Analyses	Characteristic of the landscape-ecological conditions of the territory	
Syntheses	Creation of the homogenous area – landscape-ecological complexes	
Interpretation	Classification of the territory	Specification of the landscape-ecological regulatives
Evaluation	Specification of the environmental problems	
Proposition	Proposal of the TSES and proposal of the measures aimed at the elimination of the specified problems	Proposal of the landscape-ecological optimal utilisation of the landscape

- 2nd stage: functional-technological - how: measurements for optimum functioning.

The methodology for elaboration of the both documents consists of the five basic steps. The methodology is very similar for both documents, the some steps are identical.

The main result of this documents is specification of the types and kinds of landscape-ecological problems. The environmental problems are resulting from encounters of the two groups of landscape-ecological factors - endangering and endangered factors.

Endangering factors - so called stress factors issuing mostly from the manufacturing, producing, construction sectors etc. They are negative phenomena in the landscape threatening its ecological condition. It is possible to consider these factors as the major initiators of ecological problems in landscape. The kind and extent of an ecological problem depend on localization of a stress factors in landscape, as even on duration and intensity of its influence. Endangering phenomena (stress factors) resulting from:

- industrialization (the best known phenomena are large-scale area air pollution at different degree, contamination of water and soil sources, waste material piles, etc.),
- transport (unfavorable phenomena of traffic - emissions, noise, dust, etc.),
- urbanization and recreation (extensive growth of towns, occupation of soil, devastation of the environment, waste material piles, etc.),
- agriculture (erosion, mechanical deterioration of soil, large-scale area pollution of ground and surface waters by chemicals, mechanization, reduction of verdure, enlargement of the tracks of arable land, change of meadows and pastures into arable land, removal of swampy communities, spring areas, etc.),
- forestry (chemization, mechanization, etc.).

Endangered factors - mostly those which contribute to the maintenance of the ecological stability of the landscape. They are the favourable phenomena from the ecological point of view. Endangered phenomena at this level are as follows:

- the most valuable territories for biology, ecology, geology, geography, landscape perception, i. e. the declared protected territories as well as territories of a similar quality being still without legislative protection,
- other ecologically stabilizing areas, particularly forests, meadows and pasture areas,
- protected and other important water sources, sources of curing and mineral waters, areas of drinking waters, drinking water flows and reservoirs,
- soil resources,
- recreation areas - sources of health and convalescence,
- settlement areas - essential conditions of the social and labour force reproduction.

It is possible to divide arisen problems into three basic groups (Izakovičová et. all., 2000).

Problems of the endangering the ecological stability of the landscape - they arise in the consequence of influence of stress factors to elements with high eco-stabilizing effect - protected areas or other ecologically valuable areas of the landscape (forest, water areas, meadows, pastures, areas of public greenery etc.). To the most important problems in this category there belong:

- treats to protected and eco-stabilizing areas from the influence of material sprinkled on roads in winter,
- treats to protected and eco-stabilizing areas by intensive transport,
- treats to protected and eco-stabilizing areas from negative influence of the intensive recreation,



- taking of eco-stabilizing areas for development of socio-economic activities such as the construction of industrial complexes, transport routes, housing and others,
- treats to protected and eco-stabilizing areas by industrial and transport immissions,
- treats to protected and eco-stabilizing areas by extraction of the mineral sources,
- treats to protected and eco-stabilizing areas by chemicals from agricultural and forest production,
- treats to protected and eco-stabilizing areas by waste.

a) **problems of the endangering the natural resources**

- they arise from territorial conflict of stress factors and natural resources. The result of this conflict is deterioration of quality and quantity of natural resources. To the most important problems in this category there belongs endangering the territories important from the viewpoint of drinking water, areas with good quality soil, with productive forests:

- high consumption of water as a result of its uneconomic use for technological purposes, supplies to the population, and high losses in the water supply network,
- extensive treats to underground water as a result of the use of chemicals in agriculture,
- release of waste water from industrial and communal sources,
- treats to water resources from livestock production - high concentration of livestock production,
- treats to water resources from the influence of material sprinkled on roads in winter,
- taking of good quality soil for non-agricultural activities, such as the construction of industrial complexes, transport routes, housing and others,
- contamination of soils by heterogeneous substances produced especially by manufacturing industry, urbanization, intensive transport and others,
- treats from the actual use of the soil resources - by intensive agricultural: erosion, accumulation processes, compaction of the soils, increased salinity, one-sided improvement of the soil nutrients, soil exhaustion and reduction of total fertility,
- excessive extraction of timber from forest ecosystems, and its replacement with artificial monocultures,
- diminution of forest ecosystems as a result of widening the techno sphere,
- decline of forest ecosystems because of the effect of emissions and acid rain,
- air pollution by heterogeneous substances, mostly originating from industry transport, urbanization and agriculture.

Problems of the endangering the immediate human environment - they arise from the influence of stress factors on areas where the people reside permanently (living houses, recreation areas, etc.). From this group of problems most expressively manifested are following ones:

- very polluted atmosphere in regions with high concentration of inhabitants,
- intensive transport in innertowns,
- unfavourable hygienic implications of livestock production,
- lack of clean water sources for supply of inhabitants,
- consumption of water from inconvenient sources as are individual domestic wells.

Proposition represents the final phase in solution to environmental problems. Its goal is to eliminate accumulation of environmental problems. Solution to environmental problems has two aspects:

- aspect of spatial organization, representing an optimum land-use,
- technological aspect, which represents ecologization of technology used in landscape.

From the **spatial aspect** it is necessary to:

- determine functions for each area, which are not limited or restricted by one of the landscape-ecological parameters
- select this activity and function, which the most harmonize with natural and socio-economic conditions of the territory

From the **functional aspect** it is necessary to realize following proposals:

- Proposals aimed at the creation of the functional ecological network, consist from the following steps: determination of the present biocentres, biocordors, etc. creation of the new elements of the TSES, revitalization of the present elements of the TSES,
- Proposals of the nature protection and natural resources protection: confirmation of the present protected areas, fortify of the protection, proposal of the new protected areas, proposal on the abolition of the protected areas,
- Proposal of the eco-stabilizing measures: proposal of the new eco-stabilizing elements in the landscape, proposal of the optimal agricultural landscape, proposal of the eco-stabilizing measures in the forest landscape, proposal of the eco-stabilizing measures in the urban area,
- Proposal of the elimination of the stress factors: realization of the technological measures, revitalization of the loaded territories.



References

Hrnčiarová, T. et. al., 2000: **Landscape-ecological plan. Methodical procedure.** Landscape 21, Ministry of Environment Bratislava, 122. pp. (in Slovak).

Izakovičová, Z., et. al., 2000: **Territorial system of ecological stability.** Landscape 21, Ministry of Environment Bratislava, 232. pp. (in Slovak).

Miklós, L., 1986: **Stability of the Landscape in Ecological General SR.** Environment, 20, 2, p. 87-93.

Ružička, M., Miklós, L., 1982: **Landscape-ecological Planning (LANDEP) in the Process of Territorial Planning.** Ekológia (ČSFR), 1, 3, p. 297 - 312.