LANDSCAPE RESEARCH IN TOPIC AND CHORIC DIMENSION FROM THE GEOGRAPHICAL POINT OF VIEW

***Vladimír ČECH*[1]**

Abstract: *The article deals with the theory of landscape research in topic and choric dimension. The introduction deals with different ways of understanding of the essential object of the landscape research in four "centers" of its survey: German, Russian, Anglo-American, and Slovak. The following part is about the topic and choric dimensions as about the essential size categories, which contain units used for the landscape research. Both, the characteristics of the partial units of the topic dimension, and different understanding of a geotope as an essential complex unit of a geoecological landscape research, are followed by information about the units of the choric dimension.*
Key words: *topic and choric dimension, geotop, landscape, landscape research*

INTRODUCTION

Geoecology is currently focusing on the study of **landscape**. However, the term landscape is not understood by everybody in the same way. This is caused by the complicated geography development, infiltration of influences from other sciences which cooperate in landscape research and differentiated approaches of geographers. New knowledge comes with the dynamic development of this topic and the research methods improve constantly.

German geography schools (landscape-ecology communities) see the landscape as a **total geographical complex** with the emphasis on the ecological approach. The complex site analysis is the typical method used by these schools. The research in the topic dimension (on tessera) is the base for the choric synthesis and the landscape application assessment. This research includes terrain observations, landscape elements quantitative measurement (half-stationary research) and laboratory testing. It provides the researcher with general information for further research – choric structures analysis, landscape potential assessment, conflicts in landscape use, etc. Bastian – Schreiber (1994) give an example: 'landscape is the part of the Earth's surface, geosphere, which, depending on its shape, outer look, process and functional mutual correlation of its phenomena, on a concrete part of the surface, creates spatial uniformity of a certain character (total character - A. von Humboldt), '.

In Russian geographers' perception, landscape is a physical-geographical complex in a concrete as well as a general meaning (as a type). The landscape study is based on the component analysis of the mutual relations. The most often method used in this school is the deductive physical-geographical regionalization. Beručašvili - Žučková (1997): 'landscape is a genetic homogenous natural territorial complex with equal geological

1 **RNDr. Vladimír Čech, PhD.,**
Department of Geography and Regional Development, Faculty of Humanities and Natural Sciences, University of Prešov, ul. 17. novembra 1, 081 16 Prešov, e-mail: cech@unipo.sk

fundament, type of georelief and climate. It consists of the microchoras, dynamically connected and repeated on a principle, which are typical only for the given landscape'.

American authors Turner-Gardner-O'Neill (2001) present a universal definition of landscape: 'an area spatially heterogeneous at least in one studied factor'. Their approach is similar to the British one where landscape is a spatial portfolio of georelief forms.

For the **Slovak** geographers, the landscape represents a material entity, i.e. real landscape consisting of abiotical, biotical and anthropogenic components with human activity (society) as an important factor. The landscape has an aesthetic, as well as an emotional aspect (the landscape image and the landscape as an identity). It is the material, spatial and dynamic part of the Earth's surface (Earth's landscape zone) with the visual demonstration. It consists of mutually influencing natural and anthropogenic complexes of different taxonomic levels with numerous bonds and relations.

According to Drdoš (2004), the landscape can be divided into these types:

- Real landscape can be as: 1. Physical-geographical entity: physical-geographical (natural content of the real landscape) or natural landscape 2. Cultural-geographical entity: cultural landscape (anthropogenic content of the landscape) 3. Geographical, total entity: geographical landscape. The landscape as a geographical, total reality (connection between nature – technology – society), which is a subject of an interdisciplinary research. 4. Environmental entity: landscape as a human environment (life environment).
- Landscape as a perception (perceived landscape, landscape view)
- Landscape as an emotional experience (landscape identity)
- The landscape system: 1. landscape ecosystem (functional term, geographical landscape in spatial expression) 2. geosystem (geographical, physical-geographical and abiotical system) or geoecosystem (and geobiosystem)
- Landscape as a research conception 1. Geographical conception (landscape as a material entity) 2. Ecological conception (landscape as an ecosystem or a group of ecosystems) 3. Environmental conception (landscape as a home or a human environment) 4. Aesthetic conception (landscape as a perception, view and/or identity)

GEOGRAPHICAL DIMENSIONS

There are area units (complexes) of different size studied in landscape research, their size ranging from several square meters to the whole physical-geographical zone. This creates the base for the division of the physical-geographical complexes into categories according to the **geographical dimensions**. According to Bastian-Schreiber (1994), dimensions are a geographical issue. Different cartographic scales provide us with various information, map content and often miscellaneous methods are used. Usually, there are 4 dimensions: 1. **topic**, 2. **choric**, 3. **regional**, and 4. **planet** (global). This part deals with the first two, which are generally studied in the complex physical-geographical research.

In Mičian's opinion (1990), **topic** dimension contains the smallest physical-geographical complexes. These complexes carry equal dynamics and are relatively homogenous in the geoecological perspective. The physical-geographical complexes of this dimension represent the basic structural cells for the nature environment. Here we study vertical relations and bonds between the components and elements on the great scale maps (1: 5 000, 1: 10 000, 1: 25 000). Map area depends on the physical-geographical structure of the Earth's surface and can range from 1 to several ars.

THE SMALLEST TOPIC AND CHORIC UNITS

The research (geotopological stationary and half-stationary research) is carried out on representative spots – tesseras, spread on the characteristic lines determined by typical physical-geographical structures. The outcome, a catalogue of individuals, is put into the vertical types called geoforms. The areas of several equal geomers, areas of geoforms, make a complex physical-geographical unit of topic dimension – **geotop** (ecotop). When the divergence reaches 15 %, we talk about polymorph geotop or ecotop; under 15 % it is a half polymorph geo- or ecotop. Haase et al. (1991) distinguish: 1. monomorph geotops with only one elementary geomer (monomorph geotop = elementary geomer), 2. polymorph geotops containing up to 15 % foreign geomers. A geotop is in Russian literature called a **facia**, an **ecotop** in older German works. A geotop is the smallest complex, physical-geographical, relatively homogenous, spatial unit with parallel processes. This unit contains the same rock type, georelief, soil, climate, water and one biocoenose. It is also the smallest unit that can be mapped; therefore, a geotop is a complex topic unit. The partial topic units are also used in the research; they are described by Drdoš (1999): **1. A morphotop** is a homogenous geomorphologic spatial unit defined by the unified morph system processes and the geomorphographic attributes. These attributes underlie the unified form of a morph top. **2. A pedotop** is the smallest spatial soil unit defined by the unified pedogenetic and ecological processes in the soil system. The unified soil form is the main criterion for the homogeneity of a pedotop. **3. A climatetop** is the smallest spatial climate unit defined by the unified climate processes in the topic climate system. These processes underlie the unified form of a climate top. **4. A hydrotop** is the smallest spatial hydro unit defined by the unified and directed hydro processes in the hydro system. These processes underlie the unified hydro mode. **5. A phytotop** is a small spatial unit containing homogenous vegetation, i.e. one phytocoenosis. **6. A zootope** is a small spatial unit with homogenous zoocoenosis adapted to a phyto top. It can be modeled as a **biotop.** The biotop is a three dimensional site of vegetal and animal organisms or their communities. The biotic and abiotic content of this site creates such living conditions which define the functions of its biosystem. Drdoš (2004) suggests a more exact term biocoenotope considering the biotop as a complex including partial tops. Some authors include among partial tops a **lithotop** – an area with unified rock attributes.

Mičian (2000) presents three views on geotops:

- The traditional, or static point of view describes the area delimitation of a geotop. It also informs if the geotop is **monomorph** or **polymorph,** depending on the number of tiny 'heterogeneous' areas called topvariants or geomers. The processes in the geotop are not important.
- The newer **dynamic** viewpoint focuses on **processes** and is represented by a multilevel classification. The lowest hierarchical level, **the main geotop groups**, can be divided as following:

Percotops. Main features: the infiltration is not decelerated; the maximum short period of increased infiltration is in winter or after extra precipitation. There are no other signs (or slight ones up to the depth of 1 m) of extra soil moisture. There cannot be any impermeable layer. Steady average annual precipitation does not result in flowing on the surface (to form relief). All soil moisture (leftover from evaporation) is transported from the soil to the die through the year round.

Conpercotops. These tops have the same features as percotops; however, they receive more water solution from the neighboring slopes. The groundwater flows within the conpercotop.

Efluitops are mostly located in the top and middle part of a slope; therefore, water solutions flow on the surface throughout the year in a periodic and episodic way.

Afluitops are situated at the bottom part of a slope, in the slope depressions (e.g. dell). Also the water supply and the dissolved substances provide us with the dominant material mechanically. (The soil contains more nutriments and moisture than in efluitops.)

Stagnotops. The infiltration is decelerated without any side movement of the water solution (higher than 2 m). An obstruction for the infiltration could be an impermeable die or a soil horizon, slowing down the process. Typical soils are **planosols**, other types can occur as well.

Umitopes are the geotops influenced by the underground water which level oscillates from 2 m to 80 cm during the year. Fluvisols are the typical soil type of this geotop.

Umenotops' underground water fluctuates between 80 and 40 cm with prevailing glevic fluvisols and fluvi-glevic phaeozem.

Perumentops lack oxygen due to the annual underground water level higher than 40 cm. On eutric gleysols grow various layers of peat. These are the die for eutric histosols (dystric histosols). E.g. wetlands belong to perumenotops.

Irigotops are periodically or episodically flooded, also during the vegetation period, with the flood plain mode.

Technotops – artificially created tops almost completely impermeable.

Water ecosystems of dead waters are developed in deeper water reservoirs – lakes and dams.

- Minár (1998) presents the third view, **quantitative**, and recommends to distinguish (in any scale) **primary** and **secondary (gradient) homogenous units. Primary homogenous units** are defined as areas where the differentiation of observed attitudes is under the differentiation level. This estimate is based on the possibilities, research targets, time and spatial range and the individual character of the studied region. **Secondary – gradient homogenous units** change the homogeneity – gradient of the observed parameters in a certain direction (as a result of changing a soil type into another, underground level decrease, etc.).

The term **physiotop,** originating in German geography, is often referred to as an abiotop. According to Neef (1967), it can be defined as a topic unit containing mutually interactive abiotic factors, which are relatively stabile and variable (the physiotop is abstracted from a biota). When researching and mapping the landscape, the physiotop's advantages, compared to a geotop, dwell in relatively stabile signs. These are easier to formulate and quantify since the vegetation has already been changed. English literature refers to the physiotop as a **site** and the biota as a **cover.** A geotop contains both site and cover. Drdoš (1999) puts forward the importance of defining the physiotop because of its relative stability. It carries the qualities important for the ecological stability, landscape potential and other landscape use. Its area is usually a part of the ecotop's area. Some authors consider the terms geotop and ecotop as synonyms; others as an abiotic-biotic unit. Occasionaly, the geotop is considered to be an abiotic unit, which puts the geotop on the same level as the physiotop.

The horizontal relations between the topic complexes and their groups are the subject of the research in the **choric** dimension. The smallest unit of this dimension is a nanochora. It is created by the physical-geographical connection of at least two geotops with the same mutual sign. Some authors do not accept the nanochora; as the smallest unit they consider a microchora. If we acknowledge the existence of the nanochora, then the microchora consists of two nanochoras, which are connected by the activity of the physical-geographical factors. A mezochora is a higher level unit consisting of mutually connected microchoras. A macrochora is created by joining some mezochoras together. Several authors include the macrochora into the **regional dimension.**

CONCLUSION

The problem of the landscape exploration lies in the complicacy of the structures and relations among its structural parts and in the wide range of problems, which this subject of the study offers to the experts. The landscape research is mostly realized in the topic and choric dimensions. The topic dimension contains the research of the vertical relations of the physic-geographical elements and their units. The result is the assignment of the smallest quasi-homogeneous physiographical units. There are distinguished the partial topes and the complex topical units – geotopes. The subjects of the study of the choric dimension are the horizontal relations among the choric complexes and their groups. The smallest unit of the choric dimension is a nanochore, which arises from the connection of at least two geotopes on the base of a particular common feature.

Acknowledgement: This paper we prepared with the contribution of the grants: VEGA 1/4028/07 „Skúmanie a geoekologické hodnotenie zmien využívania kultúrnej krajiny vybraných podhorských regiónov Slovenskej republiky“ a VEGA 1/4366/07 „Pedogeografické aspekty multifunkčního využívania poľnohospodárskej krajiny“ na Katedre geografie a regionálneho rozvoja Fakulty humanitných a prírodných vied Prešovskej univerzity.

References

BASTIAN, O., SCHREIBER, K. F. (1994): Analyse und ökologische Bewertung der Landschaft. Gustav Fischer Verlag, Jena, Stuttgart, 491 pp. ISBN 3-334-60534-5.

BERUČAŠVILI, N.L., ŽUČKOVA, V.K. (1997): Metody kompleksnych fiziko-geografičeskich issledovanij. Izdavateľstvo Moskovskogo Universiteta, Moskva, 319 pp. ISBN 5-211-03502-X.

DRDOŠ, J. (1999): Geoekológia a environmentalistika - I. časť. Krajinná ekológia - geoekológia, krajina, životné prostredie. 1. vyd. FHPV PU, Prešov, 153 pp. ISBN 80-88722-69-1.

DRDOŠ, J. (2004): Geoekológia a environmentalistika - I. časť. Krajinná ekológia, jej environmentálne poslanie a úlohy. 2.vyd. FHPV PU, Prešov, 202 pp. ISBN 80-8068-312-3

HAASE, G., et al. (1991): Naturraumerkundung und Landnutzung. Beiträge zur Geographie, 34/1, Akademie Verlag, Berlin, 373 pp. ISBN 3-05-500396-9.

MIČIAN, Ľ. (1990): Základy náuky o fyzickogeografickej krajine. In: Mičian, Ľ. - Zatkalík, F. Náuka o krajine a starostlivosť o životné prostredie. 2. vyd. PriF UK, Bratislava, p. 17-68. ISBN 80-223-0268-6.

MIČIAN, Ľ. (2000): Three views on geotopes and methods of their mapping. Ekológia (Bratislava), 19, 2, p. 41-45.
MINÁR, J. (1998): Georeliéf a geoekologické mapovanie vo veľkých mierkach. Habilitačná práca. PriF UK, Bratislava, 165 pp.
NEEF, E. (1967): Die theoretischen Grundlagen der Landschaftslehre. Hermann Haack, Gotha/Leipzig, 152 pp.
TURNER, M.G., GARDNER, R.H., O´NEILL, R.V. (2001): Landscape Ecology in Theory and Practice. Springer, New York

VÝSKUM KRAJINY V TOPICKEJ A CHORICKEJ DIMENZII Z GEOGRAFICKÉHO UHLA POHĽADU

Zhrnutie

Problém skúmania krajiny spočíva v komplikovanosti väzieb a vzťahov medzi jej štruktúrnymi časťami i v šírke problémov, ktoré tento predmet štúdia ponúka pre odborníkov. V nemeckej škole sa presadzuje ponímanie krajiny ako totálneho geografického komplexu. Do popredia výrazne vystupuje ekologický prístup v chápaní krajiny. Charakteristické je dôsledné používanie metódy komplexnej stanovištnej analýzy. Výskum v topickej dimenzii (na tessere) je bázou pre chorické syntézy i pre aplikačné hodnotenia krajiny. Tento výskum, zahrňujúci terénne observácie, kvantitatívne merania krajinných prvkov (polostacionárny výskum) i laboratórne práce poskytuje všeobecnú informačnú bázu pre ďalšie výskumy - analýzy chorických štruktúr, hodnotenia potenciálu krajiny, konfliktových situácií vo využívaní zeme a pod. Pojmu krajina v ruskej (sovietskej) geografickej škole je najčastejšie prisudzovaný fyzickogeografický rozmer, resp. krajina je chápaná ako konkrétny fyzickogeografický komplex v konkrétnom zmysle, vo všeobecnom zmysle i ako typ. Štúdium krajiny je založené na analýze vzájomných vzťahov jej zložiek. Charakteristické pre túto školu je používanie metódy fyzickogeografickej regionalizácie, a to najčastejšie deduktívnej. Na rozdiel od nemeckej školy sa základný krajinný výskum nerobí na tessere, ale v krajine.

Výskum krajiny sa najčastejšie realizuje v topickej a chorickej dimenzii. Topická dimenzia zahrňuje výskum vzájomných (vertikálnych) vzťahov fyzickogeografických zložiek a ich prvkov, výsledkom ktorého je stanovenie najmenších kvázi homogénnych fyzickogeografických jednotiek. Rozlišujeme čiastkové - topy a komplexné topické jednotky - geotopy. Čiastkové topické jednotky sú: litotop, morfotop, klimatop, hydrotop, pedotop, biotop (Drdoš, 2004 navrhuje spresnený pojem biocenotop, lebo pojem biotop v ekológii je komplexný a zahrňuje čiastkové topy).

Komplexnou jednotkou topickej dimenzie je geotop (v literatúre sa často označuje ako ekotop). Chápeme ho ako najmenšiu komplexnú fyzickogeografickú, relatívne homogénnu priestorovú jednotku, s jednotne prebiehajúcimi procesmi. V jej rámci sa vyskytuje rovnaký typ horniny, georeliéfu, pôdy, klímy, vody a jednej biocenózy. Súčasne je to aj najmenšia mapovateľná jednotka.

Ak abstrahujeme od biocenózy, získame fyziotop (resp. abiotop), ktorý je daný abiotickým komplexom. Priestorom biocenózy je biotop (resp. stanovište biocenózy). V praxi

však patria biotické zložky geotopu k najviac antropogenizovaným častiam. Preto sa vo výskume od bioty často abstrahuje a operuje sa potenciálnou prirodzenou vegetáciou.

Predmetom výskumu v chorickej dimenzii sú horizontálne vzťahy medzi topickými komplexami a ich skupinami. Najmenšou jednotkou chorickej dimenzie je nanochora, ktorá vzniká fyzickogeografickým spojením najmenej dvoch geotopov na základe určitého spoločného znaku. Niektorí autori neuznávajú existenciu nanochory a za najmenšiu jednotku chorickej dimenzie pokladajú mikrochoru. Ak uznávame existenciu nanochor, potom mikrochora sa skladá najmenej z dvoch nanochor, spojených pôsobením fyzickogeografických faktorov. Vyšší stupeň predstavuje mezochora, ktorá je tvorená súborom fyzickogeograficky vzájomne spätých mikrochor. Spojením viacerých mezochor získame makrochoru, ktorú niektorí autori zaraďujú do ďalšej - regionickej dimenzie.

Recenzovali: Prof. RNDr. Ján Drdoš, DrSc.
Prof. RNDr. Eva Michaeli, PhD.