

**ACTA FACULTATIS STUDIORUM HUMANITATIS ET NATURAE
UNIVERSITATIS PREŠOVIENSIS**

PRÍRODNÉ VEDY

FOLIA GEOGRAPHICA 12

Ročník XLVII.

Prešov 2008

**ACTA FACULTATIS STUDIORUM HUMANITATIS ET NATURAE
UNIVERSITATIS PREŠOVIENSIS**, *Prírodné vedy*, XLVII., *Folia Geographica* 12,
FHPV PU Prešov, 2008.

Výkonný redaktor / Executive editor:

RNDr. Radoslav Klamár, PhD. – *University of Prešov, Slovakia*

Redakčná rada / Editorial board:

prof. RNDr. Eva Michaeli, PhD. – *Editor-in-Chief – University of Prešov, Slovakia*

doc. RNDr. Vladimír Baar, PhD. – *University of Ostrava, Czech Republic*

prof. RNDr. Ján Drdoš, DrSc. – *University of Prešov, Slovakia*

prof. Frédéric Dumont – *Université des Sciences et Technologies de Lille, France*

prof. RNDr. Ján Harčár, PhD. – *University of Prešov, Slovakia*

doc. RNDr. Vladimír Ira, PhD. – *Slovak Academy of Sciences, Bratislava, Slovakia*

prof. RNDr. Robert Ištok, PhD. – *University of Prešov, Slovakia*

prof. dr. hab. Antoni Jackowski – *Jagellonian University in Krakow, Poland*

doc. dr. Lučka Lorber – *University of Maribor, Slovenia*

prof. RNDr. René Matlovič, PhD. – *University of Prešov, Slovakia*

prof. Adrian Smith – *Queen Mary University of London, Great Britain*

prof. Ing. Jozef Vilček, PhD. – *University of Prešov, Slovakia*

Dr. h. c. prof. RNDr. Florin Žigrai, DrSc. – *Vienna, Austria*

Mená recenzentov jednotlivých príspevkov sú uvedené v závere každého z nich.

ISSN 1336-6149 (Acta Facultatis Studiorum Humanitatis et Naturae
Universitatis Prešovensis, *Prírodné vedy*)

ISSN 1336-6157 (*Folia Geographica*)

**SPECIAL ISSUE FOR THE 31TH CONGRESS,
TUNIS 2008.**

OBSAH

THE BRIEF PROFILE OF THE SLOVAK GEOGRAPHICAL COMMUNITY 6*René MATLOVIČ***ANALYSIS OF SOIL DEGRADATION CAUSES 25***Radoslav BUJNOVSKÝ***THEORETIC-METHODOLOGICAL BASICS OF PHYSICAL-
GEOGRAPHICAL REGIONALIZATION AND ITS REFLECTION IN
SELECTED REGIONAL PIECES OF WORK OF SLOVAK GEOGRAPHERS ..33***Vladimír ČECH***LANDSCAPE IN ENVIRONMENTAL ASSESSMENT 50***Ján DRDOŠ***HYGIENIC ASPECTS OF SHEEP BREEDING IN SLOVAK
AGRICULTURAL REGIONS 61***Eva DUDRIKOVÁ, Miroslav HÚSKA, Ján FILKO, Lucia POLAKOVÁ, Eva MICHAELI***ECOLOGICAL ORIENTATED PEST MANAGEMENT VINE
(VITIS VINIFERA) IN THE SLOVAK TOKAJ REGION 66***Jarmila EFTIMOVÁ***THE HUFF'S PROBABILITY MODEL AND ITS APPLICATION
ON SELECTED LARGE-AREA RETAIL UNITS IN KOŠICE 77***Jana FERTAĽOVÁ, Pavol VARGA***POSSIBILITIES OF APPLICATION OF MARKETING INSTRUMENTS IN
PLACE MARKETING AREA 89***Magdalena FLOREK***SPATIALLY DISTRIBUTED ASSESSMENT OF SOLAR RESOURCES FOR
ENERGY APPLICATIONS IN SLOVAKIA.....97***Jaroslav HOFIERKA, Tomáš CEBECAUER***ENVIRONMENTAL LOADS AND LAND STABILITY.....115***Ondrej HRONEC, Patrik ŠKULTÉTY, Emília HUTTMANOVÁ, Margita VILIMOVÁ***DEVELOPMENTAL POSIBILITIES AND LIMITS IN MODELS
OF SELECTED REGIONAL SYSTEMS.....122***Vladimír IRA, Milan LEHOTSKÝ***INNER GEOPOLITICS AND ITS MEANING FOR QUEST OF OPTIMAL
SPATIAL-POLITICAL STRUCTURE OF RUSSIA – SELECTED ASPECTS....131***Robert IŠTOK*

SLOVAKIA AND THE ANALYSIS OF ITS DISPARITIES	145
<i>Radoslav KLAMÁR</i>	
THE USE OF THE VORONOI TESSELLATION FOR PURPOSES OF SERVICE DISTRIBUTION DISTRICTS DELIMITATION (the example of the Prešov nodal region)	163
<i>Stela LOVACKÁ</i>	
INFORMATION-COMMUNICATION TECHNOLOGIES AND TEACHING GEOGRAPHY	172
<i>Alena MADZIKOVÁ, Ján KANCÍR</i>	
PLACE MARKETING PROCESS – THEORETICAL ASPECTS OF REALIZATION	195
<i>Kvetoslava MATLOVIČOVÁ</i>	
LANDSCAPE DIVERSITY EVALUATION ACCORDING TO LAND COVER CLASSES IN THE NORTHERN HINTERLAND OF THE ZEMPLÍNSKA ŠÍRAVA WATER RESERVOIR	225
<i>Eva MICHAELI, Jaroslav HOFIERKA, Monika IVANOVÁ</i>	
TRANSFORMATION OF PHYSICAL-GEOGRAPHIC STRUCTURE OF LANDSCAPE OF PARADYNAMIC SYSTEM OF NORTHERN HINTERLAND OF ZEMPLÍNSKA ŠÍRAVA WATER RESERVOIR	237
<i>Eva MICHAELI, Jaroslav HOFIERKA, Monika IVANOVÁ</i>	
SECOND HOMES AS A FACTOR OF THE TRANSFORMATION OF RURAL AREAS IN THE POLISH CARPATHIANS	245
<i>Miroslaw MIKA, Robert FARACIK</i>	
LES FILIERES LAITIERES SLOVAQUES: DE LA TRADITION A L'EUROPE	256
<i>Daniel RICARD, Tatiana MINTÁLOVÁ</i>	
POINT METHOD FOR THE ASSESSMENT OF REGIONAL DEVELOPMENT – POSSIBILITIES AND PRACTICAL APPLICATION	268
<i>Juraj TEJ</i>	
PROFITABILITY POTENTIAL OF THE CROP PRODUCTION IN SLOVAK REGIONS	278
<i>Jozef VILČEK</i>	
POTENTIALS OF AGRICULTURAL CROPS CULTIVATION WITH REGARD TO SOIL CONDITIONS	288
<i>Jozef VILČEK, Radoslav BUJNOVSKÝ</i>	

THE BRIEF PROFILE OF THE SLOVAK GEOGRAPHICAL COMMUNITY

René MATLOVIČ¹

Abstract: *The admission of the Slovak Republic into the European Union in 2004 and joining into the EUGEO and the Schengen area in 2007 were in particular important events that influenced the life of the Slovak geographical community in the last years. The forthcoming 31th congress of the IGU, which will be held in Tunis in this year is also very good opportunity to reflect the present stay of the Slovak geographical community. Thereat we have an ambition to present a brief profile of the Slovak geographical community with emphasis on its institutional development, legislative position, and problems of geographical research and education.*

Key words: *slovak geographical institutions, slovak geography, geographical education, geographical research*

INTRODUCTION

The admission of the Slovak Republic into the European Union in 2004 and joining into the EUGEO and the Schengen area in 2007 were in particular important events that influenced the life of the Slovak geographical community in the last years. The forthcoming 31th International Geographical Congress, which is going to be held in Tunis in this year is also very good opportunity to reflect the present stay of the Slovak geographical community. Thereat we have an ambition to present a brief profile of the Slovak geographical community with emphasis on its institutional development, legislative position, and problems of geographical research and education.

THE INSTITUTIONAL HISTORY OF THE SLOVAK GEOGRAPHY

Slovak geography went through the complex historical development that had been influenced by various contexts. From the political-geographical formation it is possible to distinguish the three periods of development, specific for their forming conditions of geographical education and research – Hungarian (Ugrian), Czechoslovak, and Slovak context. The territory of nowadays Slovakia was a sphere of interest for the geographical explorers and researchers as early as the Ptolemaios era. They would be mainly the explorers from other countries. A notable survey about a vivid preoccupation of the European science with the territory of Slovakia notified J. Tibenský and V. Urbancová (2003). The intensification of research efforts dates back to 16th century, when the first groups of humanists appear in Slovakia. Bratislava (originally Prešporok) became the first education centre, where in 1467 the first academy of university character in the area of

1 **Prof. RNDr. René Matlovič, 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 matlren@unipo.sk*

Slovakia was established - *Academia Istropolitana*. The concern over Bratislava increased soon after it had been stated a capital of Hungarian Kingdom (by the year 1783). In the following centuries some other centres had been forming, where the institutions of higher forms of education were established. An incentive factor for that had been the penetration of reformation with foundation of latin humanistic schools that had had active contacts with the European, especially German universities, what contributed to favourable conditions for the diffusion of progressive ideas into slovak territory. There was a turbulent period in Hungarian Kingdom concerning rivalisation between Catholicism and Protestantism. The Jesuits established Catholic universities in Trnava (1635) and Košice (1657). As a counterbalance, there was established an Evangelical college in Prešov in 1667, which should have become a university, but finally it did not realize. The Protestant scholars concentrated themselves also at the Evangelical lyceums in Bratislava, Banská Bystrica, Banská Štiavnica, Kežmarok, and Levoča. The Mining Academy became a very famous and important educational and research institution established in 1763 in Banská Štiavnica. In these conditions there appear the first geographical research representatives of the Slovak provenance. The pioneers of geography include for example Juraj Wernher (1497-1567), Ján Sambucus (1531-1584), David Fröhlich (1595-1648), Juraj Buchholtz senior. (1643-1724), Juraj Bohuš (1687-1722). The most widely known personality of the pre-modern era of Slovak geography was Matej Bel (1684-1749), the author of a monumental homeland study work „*Notitia Hungariae novae historico-geographica*“. From among his contemporaries we can mention Daniel Fischer (1695-1746), Karel Otto Moller (1670-1747), Samuel Mikovíni (1686-1750), Ján Tomka-Sásky (1692-1762). Later on there we could have found geographical and homeland researchers like Karol Gottlieb Windisch (1725-1793), Ján Matej Korabinský (1740-1811), Samuel Augustini ab Hortis (1729-1792), Ladislav Bartholomaeides (1754-1825), and Dionýz (Dieneš) Štúr (1827-1893). The first university professor of geography in Budapest, who was born in the Slovak village of Veľký Slavkov and who had studies at the Evangelical college in Prešov, and later became a co-founder and chairman of the Hungarian (Ugrian) Geographical Society, was Ján Hunfalvy (1820-1888).

The second half of the 19th century was a significant period for the formation of modern shape of geographical science. However, the period was not favourable for the formation of Slovak geography, because of some political and language barriers that the Hungarian government put to hinder the constitution of Slovak scholar institutions (for example the number of schools with the Slovak teaching language decreased in 1870-1918 from 1822 to 94). Furthermore in Slovakia there persisted an ideological conservativeness fastened by religious dogmatism and by prevailing rural environment, what hampered the diffusion of ideas based on the latest scientific knowledge (Klas 2006, s. 33). For these reasons the Slovak geography did not dispose of the erudite specialists and geographical research used to be just rarely represented by the scientific-popularisation attempts of homeland study workers and secondary-school teachers. Some of them became involved in the Slovak Museum Society founded in 1895 (e.g. Ján Volko-Starohorský). This situation endured until the fall of Austria-Hungary in 1918, when the Slovak secondary school professors, Vítázoslav Cintula and Jožo Martinka, started to be publishing active.

After the foundation of Czechoslovak Republic in 1918 the conditions for science and geography development markedly raised. In 1919 the Comenius University in Bratislava

was established. In the 1920s the institutional fundamentals of geography in Slovakia were laid. Geography commenced to be lectured at the university ground back in 1921 due to an ethnographer professor Karel Chotek (1881-1967). In 1923 there was established a workplace at the Faculty of Arts called Geographical Seminar. The geography lectures covered the Czech professors from Charles University in Prague – Jiří Viktor Daneš (1880-1928), František Štůla (1883-1943) and Jiří Král (1893-1975) (Lauko 2006). Jan Hromádka (1886-1968) had a significant role in the formation of modern Slovak geography. He acted since 1930 as a private lecturer and since 1938 as an assistant professor of physical geography. In 1940 had been the Geographical Seminar moved under the newly established Faculty of Sciences as a Geographical Institute, and Jan Hromádka became its first director. At this time he also established the Geographical Institute at the Business Academy in Bratislava (later the Economic Academy, today the University of Economics). Throughout his short function (1938-1946) he educated the first generation of Slovak geographers, some of them later became well-known researchers and educators – for example Štefan Bučko, Štefan Fekete, Ján Hetteš, Ladislav Kvietok, Teodor Lamoš, Michal Lukniš, Matej Papík, Pavol Plesník, Dominik Polakovič, Anton Šíma, Eduard Šímo, Ján Verešik. Very important for the academic geography were also the two habilitations under leadership of Jan Hromádka. In 1946 Michal Lukniš habilitated under him for the physical geography, and in 1949 Anton Šíma for the human geography (Lukniš 1987).

Institute of Geography of the Slovak Academy of Sciences and Arts in Bratislava presented another institution, where Jan Hromádka acted. The institution was established in 1943 under the historian František Bokes. In 1944 for some personal problems the institution factually ceased to exist. The institution was re-established at the end of 1945 with the chairman Jan Hromádka. He remained a chief even after his move to Prague in 1946 until 1950.

Political contest for power in the post-war Czechoslovakia had affected the higher education as well, which however in the spirit of old academic traditions endeavoured to keep the apolitical spirit within its pedagogical and research-scientific activity. The change of political regime in February 1948 meant a principal turnover in the life of the nation and its society. Repression of academies and universities and their insertion into the new school system and culture was a basic precondition for the preparation of the intelligentsia under the communist ideology. The management system and the structure of academic, university and faculty organs led to the dissolution of relative independence and self-administration of the academic community and to establishment of a strict unitarian control. Despite of directive interventions from state and party organs, geographical institutions played an important role in the education and training of specialists. It was a period of significant quantitative development and complex institutional progress. Some workplaces were established out of Bratislava. At the end of the 1940s and beginning of the 1950s some geographical workplaces were established with specification on teachers' training in Prešov, Banská Bystrica and Nitra. Some time these workplaces functioned also in Martin and Trnava. Social demand for geo-scientific knowledge led to formation of faculty of geological-geographical sciences that existed in 1952-1959. In connection with its foundation the original geographical institute was divided into the Department of Physical Geography and the Department of Economic Geography. In this time there was also an individual geographical workplace at the Pedagogical Academy in Bratislava.

On the basis of Slovak Academy of Sciences and Arts there was established the Slovak Academy of Sciences (SAS) in Bratislava in 1953 including the Institute of Geography. The institute was classified among the institutes of the first section of sciences integrating the workplaces that explore the inanimate nature. Bezák (1993, p. 360) noticed that this, not quite an adequate classification, caused an unsymmetrical development of scientific discipline in favour of physical geography. There was also a positive effect, for the trends had kept the scientific research in human geography from the ideological influences and strict political control, which occurred at many social science institutes. One of the effects was rather a liberal personal politics what enabled some religiously or ideologically unreliable researchers fired from universities to find refuge at the institute.

The institutional structure of the Slovak geography had thereby stabilized and later on there occurred only little changes. In 1966 an individual research workplace, the Cabinet for the Landscape Research, was established at the Pedagogical Faculty in Prešov, which was in 1981 integrated into to Department of Geography. In 1974 there was established the Department of Regional Geography at the Faculty of Sciences in Bratislava. In Košice there existed in 1978-1992 a detached workplace of the Institute of Geography SAS, which focused on the research of The East-Slovakian Lowland.

After 1989 the social-political and economic conditions changed. The parliament democracy, market regime, and academic liberty were restored. The institutional development of geography partially reflected the new tendencies in the sphere of research techniques as well as the applied research. In 1992 there was founded the Department of Cartography, Geoinformatics and Remote Sensing. Several departments had renamed in reflection to their current specialisation (for example to the problems of geoecology or regional development). New geographical workplaces were established at universities in Košice (in 1998) and Ružomberok (in 2003).

Tab. 1: *Institutional development of geography in Slovakia (1923-2007)*

name of institution	seat	year of establishing (existence)	founder leader (contemporary leader)	contemporary name of institution
Geographical Seminar of the Philosophical Faculty CU	Bratislava	1923-1940	Karel Chotek	
Geographical Institute of the Faculty of Natural Sciences CU	Bratislava	1940-1952	Jan Hromádka	
Geographical Institute of the Business Academy	Bratislava	1940	Jan Hromádka <i>Ema Mišúnová</i>	Section of Geography of the Department of Public Administration and Regional Development, National Economy Faculty, University of Economy
Institute of Geography of the Slovak Academy of Sciences and Arts	Bratislava	1943	František Bokes <i>Vladimír Ira</i>	Institute of Geography Slovak Academy of Sciences

Institute of Geography of the Pedagogical Faculty of the Slovak University	Prešov (do r. 1952 Košice)	1949	Matej Papík <i>Eva Michaeli</i>	Department of Geography and Regional Development, University of Prešov, Faculty of Humanities and Natural Sciences.
Department of Physical Geography, Slovak University, Faculty of Geological-geographical Sciences	Bratislava	1952	Michal Lukniš <i>Miloš Stankoviansky</i>	Department of Physical Geography and Geoecology, Comenius University, Faculty of Natural Sciences
Department of Economic Geography, Slovak University, Faculty of Geological-geographic Sciences	Bratislava	1952	Anton Šíma <i>Pavol Korec</i>	Department of Human Geography and Demogeography, Comenius University, Faculty of Natural Sciences
Department of Geography of Higher Pedagogical School	Banská Bystrica	1954	Jozef Fraňo <i>Pavel Michal</i>	Department of Geography and Landscape Ecology, M. Bel University, Faculty of Natural Sciences
Slovak Geographic Society under SAV	Bratislava	1955	Michal Lukniš <i>René Matlovič</i>	Slovak Geographic Society under SAV
Department of Homeland studies, Pedagogical Institute	Nitra	1959	Ján Szabadi <i>Alena Dubcová</i>	Department of Geography and Regional Development, Constantine the Philosopher University, Faculty of Natural Sciences
Department of Homeland studies, Pedagogical Institute	Trnava	1959-1982	Ján Sabaka	
Department of Homeland studies and History, Pedagogical Institute	Martin	1961-1964	Jozef Kosír	
Department of Regional Geography, Comenius University Faculty of Natural Sciences UK	Bratislava	1974	Oliver Bašovský <i>Viliam Lauko</i>	Department of Regional Geography, Landscape Protection and Planning, Comenius University, Faculty of Natural Sciences UK

Department of Cartography, Geoinformatics and Remote Sensing, Comenius University Faculty of Natural Sciences CU	Bratislava	1992	Jozef Krcho <i>Eva Mičietová</i>	Department of Cartography, Geoinformatics and Remote Sensing, Comenius University, Faculty of Natural Sciences UK
Department of Geography, P. J. Šafárik University, Faculty of Natural Sciences	Košice	1998	Zdenko Hochmuth <i>Zdenko Hochmuth</i>	Institute of Geography, P. J. Šafárik University, Faculty of Natural Sciences
Department of Biology and Geography, The Catholic University, Faculty of Education	Ružomberok	2003	Rudolf Novodomec <i>Rudolf Novodomec</i>	Department of Geography, The Catholic University, Faculty of Education

SLOVAK GEOGRAPHIC SOCIETY

The scientific society presents a peculiar institutional structure of each scientific branch. In respect to a specific development of the Slovak geography within a Czechoslovak context, the social activity had been also realized within the Czechoslovak Geographical Society, which tradition dates back to 1894. The Slovak geographers would regularly participate in meetings and other events organized by this society. In 1946 the subsidiary in Bratislava was established called the Slovak Geographic Society led by Jan Hromádka. The development of Slovak geography as a science, its wider penetration into the school system on all level, and the continuous growth of personal background were the basic premises for the formation of independent geographical society. In 1955 the preparatory committee started to work (Mikuláš Konček, Michal Lukniš a Ján Hanzlík) and on December 8th in 1955 the constitutive meeting of the Slovak Geographic Society under SAS took place in Bratislava. The managing body had been built-up by seven membered Slovak central committee of the society led by the chairman. Michal Lukniš had been elected the first chairman of the society. The committee comprised of Mikuláš Konček, Pavol Plesník, Jozef Martinka, Ján Hanzlík, Koloman Ivanička and Ján Purgina. In 1959 the first regional subsidiary was established – the East Slovak subsidiary in Prešov. The first meeting of the society took place in Bratislava in 1959. At this time the society registered 175 members. In the following period there were established another regional subsidiaries – the West Slovak in Bratislava (in 1965) and the Central Slovak in Banská Bystrica (in 1966). Furthermore, in 1960 the speleological subsidiary was founded seating in Liptovský Mikuláš. The society had 372 members in 1967. The members would regularly meet at general assembly within the congress. Until now there took place 14 meetings (since 1998 they are called congresses) – in 1959, 1961 and 1991 in Bratislava, in 1964 in Košice, in 1967 in Liptovský Mikuláš, in 1970, 1986 and 2006 in Banská Bystrica, in 1974 and 2002 in Nitra, in 1978 in Levice, in 1982 and 1998 in Prešov and in 1994 in Častá. At the head of the society were Michal Lukniš (1955-1970), Pavol Plesník (1970-1974), Emil Mazúr

(1974-1978), Ján Drdoš (1978-1986, 1990-1992), Oliver Bašovský (1986-1990), Michal Zaťko (1992-1998), Jozef Mládek (1998-2006) and René Matlovič (since 2006).

Nowadays the Slovak Geographic Society associates above 300 geographers. It has five regional (Bratislava, the West Slovak, the Central Slovak, the East Slovak, and Košice) and the three specialised sections (s. of theoretical geography, applied geography, and school geography). Every four years the society organizes the congress, which includes the general assembly, the supreme body of the society. The forthcoming congress is going to be held in Košice in 2010.

CONTEMPORARY PERSONAL AND INSTITUTIONAL BACKGROUND OF THE ACADEMIC EDUCATION AND GEOGRAPHY RESEARCH IN SLOVAKIA

At present it is possible to depict the eight geography workplaces representing the base of the Slovak geography in the six centres (Bratislava, Prešov, Banská Bystrica, Nitra, Košice and Ružomberok). There is together 180 members of staff, 140 out of them are creative and 32 technical-administrative (situation to 15.1.2008). They include 13 professors, 30 associate professors (docents) and 58 other members of staff with PhD. degree. From the total personal potential point of view there is in Slovakia 16 professors including emeritus, appointed in geography any other geographical field (Pavol Plesník, Koloman Ivanička, Ján Košťálik, Jaroslav Mazúrek, Michal Zaťko, Ján Paulov, Jozef Krcho, Jozef Mládek, Anton Bezák, Eva Michaeli, Ján Oľahel, Mikuláš Huba, Jozef Vilček, Jozef Minár, René Matlovič and Viliam Lauko). The next two are going to be appointed professors (Pavol Korec and Robert Ištók). Besides them, the geographical workplaces have also some professors from relative fields (geology, environmental studies, landscape ecology) - Ján Harčár, Ján Drdoš, Vladimír Drgoňa, and Florin Žigrai. The bearing personal core of geography also includes associate professors who achieved a scientific degree doctor scientiarum (DrSc.) - Jozef Kvitkovič, Ľudovít Mičian, Jozef Jakál, Juraj Žudel, and Ján Feranec.

Within the Slovak geographical workplaces there are 14 bachelor, 14 master, and 6 postgraduate (doctoral) study programmes that is together 34 study programmes in a credit (ECTS) study system. There are together 3 328 students of geography at mentioned workplaces (31.10. 2007), 1 520 out of them of teachers' programme and 1 742 students of specialized studies. Geography disciplines have 88 postgraduate students. The most distinguished centre is Bratislava with the three workplaces – at the Faculty of Natural Sciences at the Comenius University, Institute of Geography of the Slovak Academy of Sciences, and at the National Economy Faculty of the University of Economy. These workplaces integrate 100 members, what is 57,1% from the total number of staff. Out of them there are 7 professors, 17 associate professors and 37 members of staff with PhD. degree. In Bratislava there concentrates 57,1% of all professors and associate professors of geography within Slovakia, and 61% of total number of staff with PhD. degree in Slovakia. Bratislava offers the widest scale of study programmes on the three levels - 4 bachelor, 7 master and 5 postgraduate study programmes, what is together 16 study programmes (47% of their total number in Slovakia). The Comenius University in Bratislava disposes of the right to hold habilitations and to appoint professors in regional geography. The

share of geography students at the Comenius University from the total number in Slovakia reaches 41,6%, and the share of PhD. students even 65,9%.

The oldest out of Bratislava geography education and research centre is the town of Prešov, which is situated in the Eastern Slovakia. Prešov is the third largest Slovak town, where is the Department of Geography and Regional Development at the University of Prešov. In Prešov there act 17 members in the staff (9,7% of the total Slovak number), out of them 14 are creative (9,8% of the Slovak number), out of them are 3 professors, 2 associate professors and 7 members of staff with PhD. degree. In Prešov there concentrates 11,9% of all professors and associate professors of geography within Slovakia, and 12% of all persons with PhD. Prešov offers to study geography on all three levels – 2 bachelor, 2 master, and 1 postgraduate programme. It is the only one workplace, where it is possible to hold habilitations and appointing proceedings in the discipline of geography. The share of geography students in Prešov from the total number in Slovakia reaches 14,2%, and the share of postgraduate students 34,1%.

Banská Bystrica in Central Slovakia is another important centre of geography education and research, where is the Department of Geography at the Matej Bel University. There is 20 people in the staff, out of them 18 are creative. They have 1 professor, 4 lecturers and 4 PhD. people. Banská Bystrica offers 2 bachelor and 1 master study programme. The share of geography students in Banská Bystrica in total number of Slovak geography students is 9,8%.

Nitra represents a traditional centre of geography education, where is the Department of Geography and Regional Development at the University of Constantine the Philosopher. The department has 16 membered staff, out of them 14 are creative. Nitra has 1 professor, 1 lecturer and 4 PhD. people. The department in Nitra offers 3 bachelor and 2 master study programmes. The share of geography students at the department in Nitra is 13,1%.

In the last decade there grew out another geography centre in Košice, where is the Institute of Geography under the University of P. J. Šafárik. The institute consists of 12 people, out of them 2 associate professor and 4 PhD. people. The institute in Košice offers 2 bachelor and 1 master study programmes. The share of geography students in Košice presents 7,8%.

The youngest geography workplace within Slovakia could be found in Ružomberok, where is the Department of Geography at the Catholic University. The department includes 10 members with 1 professor, 2 lecturers and 2 PhD. people. The department realizes 1 bachelor and 1 master study programme. The share of geography students in Ružomberok is 13,4% out of the geography students in Slovakia.

Tab. 2: Study programmes of geography workplaces in Slovakia (2007)

<i>Institution</i>	<i>Bachelor study programmes</i>	<i>Master study programmes</i>	<i>Postgraduate study programmes</i>
Comenius University in Bratislava	• geography teaching, • geography and cartography, • geography in administration, • geography, regional development and European integration	• geography teaching, • geographical cartography, geoinformatics and remote sensing, • physical geography and geoecology, • geoecology and landscape planning (in cooperation with environmentalists) • human geography and demography, • human geography in administration, • regional geography, regional development and European integration	• <i>physical geography and geoecology,</i> • <i>regional geography,</i> • <i>geography didactics</i>
Institute of Geography Slovak Academy of Sciences in Bratislava			• <i>physical geography and geoecology,</i> • <i>regional geography,</i>
University of Prešov	• geography teaching, • geography in regional development	• geography teaching, • geography in regional development	• <i>regional geography and regional development</i>
Matej Bel University in Banská Bystrica	• geography teaching, • geography and landscape ecology	• geography teaching,	
Constantine the Philosopher University in Nitra	• geography teaching • geography in regional development, • social geography	• geography teaching, • geography in regional development	
Pavol Jozef Šafárik University in Košice	• geography, • landscape structure and its transformation	• geography teaching,	
The Catholic University in Ružomberok	• <i>geography teaching,</i>	• <i>geography teaching,</i>	

Tab. 3: *Personal potential of geographic workplaces in Slovakia (15.1.2008)**

	Total number of staff	Total number of teachers and research staff	Professors	Associate professors	Other members of the staff with PhD. degree	Other teachers and research assistants
CU Bratislava	59	50	5	11	21	13
IG SAS Bratislava	43	23	2	5	16	7
EU Bratislava	3	3	0	2	0	1
Prešov	17	14	3	2	7	2
B. Bystrica	20	18	1	5	4	8
Nitra	16	12	1	1	4	6
Košice	12	11	0	2	4	5
Ružomberok	10	9	1	2	2	4
SLOVAKIA	180	140	13	30	58	46

*full professors and associate professors only

Tab. 4: *Number of students at universities and SAS in Slovakia (31.10.2007)*

	Total number of students	Full time students	Part time students	Total number of students of the geography teaching study programmes	Total number of the students of the non-pedagogical study programmes	Total number PhD. students
CU Bratislava	1383	835	548	167	1216	58
IG SAS Bratislava	2	0	0	0	0	2
Prešov	471	448	23	241	202	28
B. Bystrica	328	292	36	232	60	0
Nitra	436	413	23	247	189	0
Košice	261	261	0	186	75	0
Ružomberok	447	333	114	447	0	0
SLOVAKIA	3328	2582	744	1520	1742	88

Source: Institute of information and prognosis of Ministry of Education SR (www.uips.sk).

THE LEGAL STATUS OF GEOGRAPHICAL SCIENCE IN SLOVAKIA

The position of geography within university education context in SR is being influenced by the System of study fields of academic education that had been issued by the Ministry of Education of SR. The system includes all geography fields of study in the group nr. 4 Natural Sciences, subgroup 4.1. Inanimate Nature Sciences. Here we can find the field of Geography 4.1.35. (it is specified for the first and second academic education) and fields for the third (postgraduate) level – 4.1.36 Physical Geography and Geocology, 4.1.37 Human Geography, 4.1.38. Regional Geography, and 4.1.39. Political Geography.

Geographical Cartography, Geoinformatics and Demography are absent in the system of fields. This clearly implies that the position of geography is in total contradiction with the metageographical knowledge about the ontological and epistemological vindication of geography autonomy. Rather we propose to define an individual group of fields within Geography Science. It is also needful to include the following fields into geography – demography, geographical cartography and geoinformatics as the fields for the third stage of study. The position of geography as a scientific discipline in SR is legally stated by Edict of the Ministry of Education SR nr. 1055/2003-11), by which is in group 1. Natural Sciences and subgroup 1.6. Geography Sciences integrated only the 1.6.1. Physical Geography and Geoecology, 1.6.2. Geographical Cartography and 1.6.3. other related geographical fields. Another geography disciplines were involved into group 1. Natural Sciences, into the subgroup 1.2. Informatics Sciences was involved the Geoinformatics nr. 1.2.4. The group nr. 5. Social sciences and subgroup 5.10. Other Social Sciences include: 5.10.1. Human Geography, 5.10.2. Regional Geography, 5.10.3. Political Geography, and 5.10.4. Demogeography and Demography. Compared to the past, the Historical Geography has been removed from the nomenclature. If the position of geography within the system of study programmes is considered incorrect, the classification of geography disciplines into the fields of research and development seems to be a catastrophe for the Slovak geography. Geography as a science ceased to exist practically. On this subject it is repeatedly needful to achieve that geographical sciences would create an independent group of disciplines at the same hierarchic level as the natural or social sciences etc. Some halfway solutions seem to be groundless and metageographically unsustainable.

SCHOOL GEOGRAPHY

The position of geography in the system of education is in comparison with neighbouring countries quite positive. The meaning of geography has maintained by now. Geography as an individual subject has been so far implemented into the education at primary schools, grammar schools, and some types of specialized schools. Geography at primary schools became markedly popular. International comparisons show that this primary sphere belongs to the most successful one. The subject follows the former pathway of formal didactic aspect as in other subjects. Geography at secondary schools became, after some ambitions to suppress it, has proved and belongs to exceedingly preferred subjects. This might eventuate in certain exhaustion of teachers (markedly lower number of geography teachers than of the subjects involved in the natural scientific group, which are compulsory). Geography at secondary schools, especially grammar schools, belongs to trends determining subjects. The results of school leaving examination samples belong to the best from the whole scale of secondary schools (Tolmáči, Čižmarová 2006).

The preparing curricula reform presents a certain risk, since it might be inspired by several European education systems, where the position of geography is marginalised. Curricula reform reacts to the crisis of education system resulting from the over proportional factographic information from certain special sciences and from the lack of emphasis on the preparation of young people for everyday life. However, the geography might offer the path towards an integral view of the world in mutual connections. Geography synthesises the knowledge of natural, human and technical origin, thus it has the integral character and it is therefore inconceivable that it would dissolve in other integral block subjects (nature,

civics). This would definitely cause the loss of cardinal mutual relations among nature and human society in education, what would negatively influence the further education, intellectual development and environmental awareness of our incoming generation. Even today we might observe in our society and in the part of the political elites a certain disregard towards landscape demonstrative in a depredatory economy oriented exclusively towards short-time effects. It is necessary to strictly articulate the education contribution of geography by the preparation of curricula reform and do not allow the weakening of its position (Matlovič 2006).

GEOGRAPHY RESEARCH IN SLOVAKIA

– MAIN EXTERNAL INSPIRATIONS BEFORE 1989

Already at the beginning of the formation of modern geography the regional-geographic research tradition and thinking has started to develop. These tendencies were growing due to Jan Hromádka and his followers. Jan Hromádka realised a half-year stay at the Paris Sorbona University in 1930s. At that time there acted A. Demangeon and E. De Martonne, and at the Collège de France there was J. Brunhes. The French regional-geographic concept, especially the *genre de vie*, have influenced Hromádka's regional-geographic works, mostly his synthetic work *The general geography of Slovakia* from 1943. His student Michal Lukniš has implemented similar approaches in a micro regional study of Jakubianý.

After 1948 the Slovak geography fell under the influence of the Soviet school based on dialectic and historical materialism. The research in the 1950s had markedly empirical character. Some sectional geography researches were developing (geomorphology, climatology, hydrology, pedogeography, geography of settlement, geography of industry etc.). This was to a certain extent connected with the denial of Hettner-Hartshorn chorological concept of geography. Geomorphology recorded the most significant development. It was influenced by German school oriented at climate-genetical problems. The crux of the research was represented by flat covers represented by conceptions of M. Lukniš and E. Mazúr (Urbánek 1993). Remarkable results were achieved in the carst geomorphology due to A. Droppa and J. Jakál. From the geomorphologic mapping point of view, there were significant monographies by E. Mazúr about the Žilina basin and the adjacent mountains from 1963 and by M. Lukniš about the relief of The High Tatras and their foreland from 1973. The modern human geography was established by Koloman Ivanička, that was under influence of the polish geographical school. He finished his studies at the Warsaw university. Gradually, the specialisation of Slovak geographers was growing to solve also different geomorphologic and other physical-geographic problems. The shift in geography orientation in Slovakia was confirmed by the scientific conference concerning theoretical problems of geography, which took place in Bratislava in 1961. Participants pointed out that the Slovak geography had overcome the geographical determinism, positivism and anthropo-geographical concepts emphasising the morphological aspects of the study. Relations between physical and economic geography had been also discussed in reflection to the conflict between monists and dualists in the Soviet geography. The conference draw attention to the need of synthetic research of territorial complex on the basis of materialistic dialectics and more intensive implementation of geography in the solution of problems concerning national economics and social practice. This confirmed

the new ideological and methodological basis of geography and there was approved a programme of socially engaged geography (Hanzlík 1961). As Lauko writes (2006, p. 48-49), the Slovak geography has become to the systematic orientation under the influence of physical geography, especially of the Soviet and German *Landschaft* school. These concepts were represented for example by Armand, Isačenko, Sočava, Neef, Haase. In our country it was the work of J. Drdoš (1965) offering theoretical-methodological knowledge about the landscape of the Soviet and German provenience. At the university in Bratislava E. Mičian focused on the problem of theoretical-methodological complex study of the landscape and meta-geography. Another contribution to the landscape studies presented the work of P. Haggett (1972). The ambition of geography was to bring a complex portrait of a surrounding world and the environment and to solve the relation between man and his environment (Drdoš, O'ahel' 2006, p. 128). This contributed to the development of landscape synthesis for the landscape planning. It was represented mostly by the members of the Institute of Geography SAV – E. Mazúr, J. Drdoš, J. Urbánek, J. O'ahel', M. Lehotský, M. Huba. By the initiative of the Slovak geography was in 1979 organised an international symposium about the state and perspectives of landscape research that supported the formation and function of the IGU working group for the landscape research (Landscape Synthesis) under the leadership of E. Mazúr in 1980-1988. These activities were followed on in 1992 by the programme within IALE, led by Mossom and Richling (Drdoš, O'ahel' 2006). The concept of the Atlas of SSR (1980) had been also based upon the ideas of landscape synthesis.

Human geography was developing in rather a reduced form than the economic one during the era of socialism. The stress was put on the problems concerning geography of production, rational space organisation, and processing of records for land use planning. The study of population preferred the topics relative to provision of labour forces. The geography of settlement focused mostly on the function of the settlement. Some synthetic shifts were represented by research of land use. The ideas of Soviet geography had been uncritically imported to the field of the Slovak geography. One of them was the conception of territorial production complexes. Over time in the 1960s there appeared certain diversification of thematic and methodological focus of human-geographic research. The geography of transport, tourism, market and services commenced to develop. The Slovak geography thus, with a certain delay, reacted to the new developing tendencies of the world geography thinking. At the end of the 1960s the first attempts to reflect the development of quantitative geography appear due to the Anglo-Saxon geography. It was especially concerned with some new research methods based on modelling, application of the general theory of systems, methods of regional analysis etc. This group of Slovak geographers includes J. Paulov, J. Krcho, A. Bezák, Š. Poláček and other. Nomothetically oriented quantitative geography offered certain asylum for geographers who had not favoured the communist forced ideological Marxist geography. After certain release in the 1980s, the social-geographical orientation appeared in the Slovak geography, as well as the first attempts to reflect the humanistic stream of geography thinking start to appear (e.g. P. Radváni, V. Ira).

GEOGRAPHY RESEARCH IN SLOVAKIA AFTER 1989

Social-political and economic changes in 1989 and 1993 have markedly influenced the development of geography research in Slovakia. The renewal of parliament democracy and market economy gradually led to changes in spatial organisation of the Slovak society. Some new problems appeared like unemployment, poverty, regional disparities etc. the fall of former ideological restrictions enabled to develop some topics that had been forbidden before (political geography, election geography, geography of religions, social geography, cultural geography). The penetration of new technologies enabled in a larger extent to exploit the technologies of geographical information systems. The Slovak geographical community reflected also another factors. As Ira, Huba and Lehotský argue (2006), the development after the Cold War became more fluid and unpredictable, and the general atmosphere of big global economic, social, cultural, and environmental changes got to a certain extent out of control of the world community. This all demands a qualified reflection, a need to solve the new solutions and new organisation and administration of the world, what only confirms the social relevance of geography.

The transformation era has opened the opportunities to communicate with the world geography, brought larger variety of approaches, as well as increased the interest in new environmental and social-economic problems. The replacement of „unity“ by plurality enabled the variety of research orientations. Immediately after the social changes, the group of nomothetically oriented quantitative geographers formed the general opinion in geography. As soon as the end of 1990s the younger generation of geographers honoured their word, who experiment with antipositivistic and post-modern conceptions, and besides quantitative methods they try to implement some qualitative research approaches. Beyond the positive aspects the changes have brought also some negative consequences lying in the fragmentation of geographical research. Insufficient financial support of science and research together with the decrease of social importance of a science and academic education have been negatively expressed in infrastructural and personal development of geography in Slovakia (Ira, Huba, Lehotský 2006, p. 57-58).

When evaluating the contemporary results of the research attempts of the Slovak geographers after 1989 we can issue from the work of Ira, Huba and Lehotský (2006). The authors consider the following positive aspects of nowadays era:

- geographical research commenced to deal with some new topics that had connection with the social interest (election geography, political geography, geography of religions, spatial organisation of public administration, regional disparities and regional politics, transformation of intraurban structures, poverty and unemployment, labour market, diffusion of foreign investment, sustainable development, land cover changes, land potential, natural hazards and risks of land exploitation, alternative resources, life quality, second demographic transition, etc.)
- partial penetration into the public politics by solving some all-society problems,
- implementation of geography in solution of some environmental and sustainable development problems,
- realisation of great atlas works (e.g. Atlas of churches, religious communities and religiousness in Slovakia 2000, Atlas of the landscape of the Slovak Republic 2002, Atlas of the population of Slovakia 2006),

- technological progress in implementation of modern devices of geographical research (geographical information systems, remote sensing),
- more intensive application concentration on the research concerning prognosis, local and regional development),
- more intensive cooperation of human geography with some social disciplines (sociology, politology, economy), and improvement of the cooperation of physical geography with some natural sciences,
- enrichment of theoretical-methodological knowledge (in regional taxonomy, regional analysis, interaction models, extrapolation models, qualitative spatial analysis data, sources and approaches in demogeography, urban geography, social geography, geography of time, methodology of geoeological research, morpho-structure and neotectonics research, interpretation and creation of complex geomorphologic maps, new approaches in geomorphology and pedology, hierarchic model of morphology of water flows and river landscape, geomorphologic analysis of cave room, development of objectives and approaches towards identification of land cover structures and hydrological response and rational exploitation of water resources).

On the other hand authors have identified some reserves and weak spots of the geographical research in Slovakia:

- ambiguity in the subject of geographical research,
- deepening dichotomy between physical and human geography, disintegration of geography into the group of free associated sector disciplines and their continuous dissolution in non-geographic specialised disciplines,
- lack of the new theoretical concepts reflecting the current problems,
- underestimating of geography as a science interpreting and promoting the area of Slovakia,
- displacement of the traditional position of geography by other sciences,
- the outflow of geographers and formation of certain polarity in orientation of geographers in connection with appearance of landscape ecology and environmental sciences what present a methodological problem for physical geography,
- absence of modern management of the science, and missing an adequate competitive scientific platform for the rising generations,
- insufficient operation with the newest world literature, what would enable to compare our results with the rest of the world,
- absence of popularisation system and geography marketing,
- insufficient penetration of geographers into renowned journals with impact factor,
- lack of interest of Slovak geographers of some relevant topics (for example new aspects of spatial organisation of society, spatial aspects of the function of financial sector, implementation of information and communication technologies, diffusion of information and innovation, European integration, impact of the transnational organisations, social-spatial consequences of globalisation, integrated management of drainages and water flows, methodology of natural hazards and their impacts, contemporary global climate changes and their responses),

- absence of a "big idea" or common motive that would integrate the research ambition for bigger number of research workers, insufficient interconnection of research programmes,
- low level of integrating of Slovak geographers in wider international projects,
- insufficient involvement in interdisciplinary researches
- absence of cultural geography

CONCLUSION

Slovak geography community attempts to submit the state of geography to a certain reflection. An example for the above attempts was the scientific seminar, which had taken place in 2005 in Prešov. It was dedicated to the development, current state and perspectives of geography in Slovakia in 21st century. The following results stemmed from the seminar:

- to confirm the sustainability of geographical unity in the context of physical and human geography integration through the research projects,
- to pursue a holistic approach on the basis of the effective cooperation of scientific (nomothetical) and antiscientific (idiographical) ways of creation of geography knowledge, physical and human geographers – platform of a "new" regional geography,
- to emphasise the epistemological confirmation of geography position through methodological approaches, and by the application of remote sensing and GIS,
- to prefer the team solution of national and foreign research projects by use of the geography workplaces network (SAS and universities) and workplaces of other scientific disciplines,
- to lay stress on the conception of research-scientific themes based on the problems of common practice,
- to establish permanent communication forum of geographical community through the web pages (e.g. on the webpage of the Slovak Geographical Society),
- to form a space for the discussion of the leading geographical workplaces about their research-scientific specialisation (Slovak geographical council),
- to pay bigger attention to the actual didactics problems and creation of teaching aids for primary and secondary schools,
- to activate the function of theoretical geography section under SGS, and to prepare the discussion oriented to the creation of social opinion on the arrangement of geography within the system of study fields and its institutional classification within the academic system,
- to intensify the attempt to popularise geography and its results in media,
- to create a forum for the discussion of study programmes of geography at universities,
- to aim at the admission of a common statement of geographical community towards the project "Curricula transformation of general-education element of secondary education in the process of preparation of youth for the demands of labour market",

or let us say to formulate some sectional topics with geography content that would be part of this project,

- to achieve an optimal proportionality of the basic and applied geography research on behalf on improvement of geography position in society.

In accordance with Florin Žigrai (2008, s. 29), it is necessary to stress, that the future development of geography is strongly connected with regional geography. The regional geography should play in the future the key scientific-managerial role in coordination of internal collaboration with other branches of geography on the one hand and in coordination of external collaboration with non geographical disciplines on the other one (Žigrai 2008, s. 29).

We are convinced that to achieve the above goals it is necessary to closely cooperate with the foreign colleagues. The Slovak geography is prepared to participate in those integration processes and with delight awaits the further fruitful cooperation. The Slovak Geographical Society became the member of EUGEO during the first congress of EUGEO in 2007, which was held in Amsterdam. The very important challenge for whole Slovak geographical community is fact, that the second congress of the EUGEO will be held in Bratislava in August 2009. Everybody from the world geographical community is invited to the capitol of the Slovak Republic.

Acknowledgement: This paper was prepared with the contribution of the grant VEGA 1/3050/06 „Kvalita života – konceptuálny rámec geografickej interpretácie priestorovej štruktúry mesta.“

References

- Atlas cirkví, náboženských spoločností a religiozity Slovenska (ed. Š. Poláčik). Chronos, Bratislava 2000.
- Atlas krajiny Slovenskej republiky, Ministerstvo životného prostredia SR Bratislava, Slovenská agentúra životného prostredia Banská Bystrica, 2002, 344 s.
- Atlas obyvateľstva Slovenska. (ed. J. Mládek). UK Bratislava 2006.
- Atlas Slovenskej socialistickej republiky, Slovenský úrad geodézie a kartografie, SAV, Bratislava, 1980.
- BEZÁK, A., (1993): Súčasný stav a perspektívy Geografického ústavu SAV. Geografický časopis, 45, 4, 359-379.
- DRDOŠ, J. (1965): O niektorých teoretických problémoch náuky o krajine. Biologické práce, 11/10, 41-82.
- DRDOŠ, J., OŤAHEL, J. (2006): Poznámky k vývoju integračného myslenia vo fyzickej geografii na Slovensku v posledných desaťročiach. Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešovensis, Folia Geographica, 10, 123-139.
- DRGOŇA, V., ed. (1994): Slovak academic geographical institutions. Slovak Geographical Council and National Geographical Committee, Bratislava, 35 s.
- HANZLÍK, J., (1961): Rezolúcia vedeckej konferencie o teoretických problémoch geografie (Bratislava 1. – 2. júna 1961). Geografický časopis, 13, 4, 313-316.
- IRA, V., MICHÁLEK, A., PODOLÁK, P. (2005): Humánna geografia v Geografickom ústave SAV v období transformácie spoločnosti v SR. Geografický časopis, 57, 4, 327-343.

- IRA, V., HUBA, M., LEHOTSKÝ, M. (2006): Príspevok do diskusie o súčasnosti a budúcnosti geografického výskumu na Slovensku v medzinárodnom kontexte. *Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešovensis, Folia Geographica*, 9, 56-60.
- IVANIČKA, K. (1983): Základy teórie a metodológie socioekonomickej geografie. SPN, Bratislava, 432 s.
- KLAS, A. (2006): Vývoj inštitúcií výskumu a vyššieho vzdelávania na Slovensku (860-2005). Ekonomický ústav SAV, Bratislava, 191 s.
- KOLEKTÍV (1992): Päťdesiat rokov Prírodovedeckej fakulty Univerzity Komenského. UK Bratislava, 335 s.
- KOREC, P. (2006): Študijné programy geografie – profesionálna orientácia geografov. *Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešovensis, Folia Geographica*, 9, 67-75.
- LAUKO, V. (2006): Transformácia slovenskej geografie, jej dôsledky a problémy. *Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešovensis, Folia Geographica*, 9, 44-55.
- LUKNIŠ, M. (1983): K vývinu geografického poznávania Slovenska. *Geografický časopis*, 35, 3, 225-246.
- LUKNIŠ, M. (1987): Prof. Jan Hromádka ako vedec, pedagóg a človek. *Geografický časopis*, 39, 2, 137-147.
- MARTINKA, J. (1964): Geografické poznávanie Slovenska. *Geografický časopis*, 16, 4, 340-352.
- MATLOVIČ, R. (2006): Geografia – hľadanie tmelu (k otázke autonómie a jednoty geografie, jej externej pozície a inštitucionálneho začlenenia so špecifickým zreteľom na slovenskú situáciu). *Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešovensis, Folia Geographica*, 9, 6-43.
- MATLOVIČ, R. (2007): Hybridná idiograficko-nomotetická povaha geografie a koncept miesta s dôrazom na humánnu geografiu. *Geografický časopis*, 59, 1, 3-23.
- OČOVSKÝ, Š. (1993): Humánno-geografický výskum na Geografickom ústave SAV. *Geografický časopis*, 45, 4, 335-346.
- TIBENSKÝ, J., URBANCOVÁ, V. (2003): Slovensko očami Európy 900-1850. AEP, Bratislava, 327 s.
- TOLMÁČI, L., ČIŽMÁROVÁ, K. (2006): Geografická edukácia na základných a stredných školách. *Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešovensis, Folia Geographica*, 9, 76-85.
- TREMBOŠ, P. (2006): Geografia a prax. *Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešovensis, Folia Geographica*, 9, 61-66.
- URBÁNEK, J. (1993): Od geomorfológie ku krajinnej syntéze. *Geografický časopis*, 45, 4, 327-334.
- ŽIGRAI, F. (2008): Regionálna geografia a „globalizácia” verzus „regionalizácia” vedy. *Forum Scientiae et Sapientiae*, XV, 1, 29-31.
- ŽUDEL, J. (1993): Dejiny Zemepisného ústavu Slovenskej akadémie vied a umení 1943-1953. *Geografický časopis*, 45, 4, 309-316.

STRUČNÝ PROFIL SLOVENSKEJ GEOGRAFICKEJ KOMUNITY*Zhrnutie*

V príspevku sa zaoberáme prezentáciou slovenskej geografickej komunity pri príležitosti konania 31. kongresu Medzinárodnej geografickej únie v r. 2008 v Tunise. Slovenská geografická komunita po vstupe Slovenska do Európskej únie v r. 2004 a do Schengenského priestoru v r. 2007 sa stáva čoraz výraznejšie integrálnou súčasťou európskej geografickej komunity. Potvrdzuje to aj vstup Slovenskej geografickej spoločnosti pri SAV do EUGEO – asociácie geografických spoločností krajín Európskej únie v r. 2007 na jej prvom kongrese v Amsterdame. Nesmiernym úspechom slovenskej geografickej komunity je získanie práva usporiadať druhý kongres EUGEO, ktorý bude v r. 2009 v Bratislave.

Recenzovali: Prof. RNDr. Dr.h.c. Florin Žigrai, DrSc.
Prof. RNDr. Eva Michaeli, PhD.

Translated by RNDr. Alena Lukáčová, PhD.

ANALYSIS OF SOIL DEGRADATION CAUSES

Radoslav BUJNOVSKÝ¹

Abstract: *Soil degradation belongs to the prominent problems on global and regional level and has relative close relationship to other environmental and societal problems such as floods/drought occurrence, food and water sufficiency & quality with direct impact on population health development.*

Immediate causes of soil degradation in agricultural sector (and partly also in forestry sector) belong the non-respecting the principles of good management practice as well as considering soil as a tool of production that serves to user to reach economic benefits. Human economy activities influence soil quality and territorial stability as in urban and industrial sectors (usually compaction and pollution) so in agriculture and forestry sector (acidification and pollution). Soil in private sector is usually considered as property that serves exclusively to owner purposes.

The above mentioned mirrors the societal values, attitudes, beliefs, inclinations, motivations, priorities, desires, behaviour that lie behind the results of society and environment development. Favouring economic view against environmental, private and group interest against cross societal ones, short term benefits against long-term ones, promotion of excessive consumption as well as permanent need to increase the economic growth of individuals or purpose-built groups - that all are masked driving forces of soil and environment degradation that is necessary to take into account at provision of sustainable soil/land use.

Key words: *soil degradation, soil use, soil protection*

INTRODUCTION

Soil degradation belongs to the significant problems on global as well as on regional level and has close relationship to other environmental and societal problems such as floods/drought occurrence, food and water sufficiency & quality with direct impact on population health evolution (e.g. Bujnovský et al., 2004; EEA, 2005; Van Camp et al., 2004).

Identification of the state of soil degradation and monitoring of soil parameters evolution represents the source of necessary information that serves as the information support for the legislation development and the realisation of necessary soil protection measures. Although this area of activities is still under the progressive development, the analysis of driving forces that directly or indirectly initiate/promote the soil degradation is perceived as very actual (e.g. EEA 2005; Van Camp et al., 2004).

¹ **Ing. Radoslav Bujnovský, CSc.,**
*Soil Science and Conservation Research Institute, Bratislava, Slovak Republic,
Gagarinova 10, 827 13 Bratislava, e-mail: bujnovsky@vupop.sk*

MATERIAL AND METHODS

The paper is focused on examination of soil degradation in Slovak conditions. Concept of *DPSIR analysis* (European Commission, 1999) serves as pragmatic frame or starting point for evaluation of soil degradation problem and related soil quality. In accordance to Loveland and Thompson (2002), drivers of environmental changes are socio-economic factors while physical, environmental and natural factors are considered rather as pressures.

In paper is presented basic/accustomed and more complex view on reasons that directly or indirectly cause the soil degradation. In line with Lambin (2005) the second approach is based on *in depth analysis* of factors that cause environmental degradation or may impede the adoption of more sustainable management practices including also individual behaviour with respect to natural resource use and management. In broader context the environment deterioration mentioned below embraces also the soil degradation.

RESULTS AND DISCUSSION

Basic analysis of soil degradation causes

The type and degree of soil degradation is affected by concrete soil use. In generally, the intensity of soil degradation decreases in order: industrial area > urban area > agricultural sector > forestry sector. Immediate reasons of the soil degradation are often remarkable and attract the attention of soil scientists and policy makers. First of all it is necessary to mention the insufficient respecting the principles of good agricultural/forest practice and relevant legislation (erosion, compaction, loss of SOM, and partially acidification as well pollution in agriculture; erosion and landslides in forestry). Giving long-term precedence to the importance of soil production function over remaining ecological ones represents significant cause of soil degradation. Till now, soil has been considered as the basic production tool that serves to farmer to gain the economic benefit. It is necessary to stress that principally soil preservation is not consistent with permanently increasing of benefit from its production use.

Economic activities affect soil quality not only in industrial and urban areas (compaction, pollution), but also the soil in agricultural and forest sector (acidification, pollution). Building of infrastructure, industrial enterprises and parks for provision of permanent economic growth was/is often realised on account of permanent soil sealing of agricultural soil. Although this process in the future is not possible to stop the intensity of sealing and quality of sealed soil can be partly regulated.

Non-negligible is also the misunderstanding of the essence of ownership relations to the soil. Soil in private sector is usually considered as property that serves *exclusively* for owner purposes. It is necessary to mention that property rights to the soil are often connected with its economic use (production function, resource of raw materials, space for economic human activities including housing construction – soil sealing). The types of ownership alone can not satisfactorily solve the problem of soil/land degradation. Property rights, even the private, should encompass also duties or responsibility especially in the case of natural resources because consequences of deterioration of ecological soil functions by owner or user have impact on other people. As Cairns (2002) introduces, there is a conflict between environmental protection and property rights. Human “rights” can not be met if the ecological life-support system is endangered by doing so. Property owns

are still misused or not understood, because instead of repairing environmental damage that occurred many years ago the human society is engaged in endless legal battles to see if present property owners can be held accountable. It is necessary to stress that human can not more consider the soil/land as commodity exclusively belonging him - in fact he is only steward that should to maintain the soil in the same quality for next generations.

It is possible to state that the importance of the soil for the human society is still not adequately appreciated (e.g. deKimpe, Warkentin, 1998; Yaalon and Arnold, 2000). Although the results of soil science research are usually used for the development of soil protection legislation and relevant educational/methodology publications, much of the expert and scientific knowledge does not have satisfactory application in practical life. Even though regular environmentally focused training of farmers or forest users brings some progress, the remaining broad population remains uninformed about the problems with soil degradation. Progress still has to be made in the area of periodical environmental education of soil users as well as in the area of increasing environmental awareness of the broader population. In line with this, the proposal for an EU Directive for soil protection (European Commission, 2006) stresses the problem of awareness and the need to address it. Moreover, the acceleration of natural disasters and human tragedies (poverty, epidemics, local war conflicts, criminality increase, etc.) masks and shifts the problems of soil degradation and its societal effects into the background of human attention.

In harmony with Gordon et al. (2001), efficient use and protection of natural resources, including soil, assumes three basic factors: *i)* adequate information, *ii)* motivation for sustainable use of soil/environmental resources, and *iii)* required capacity to adopt the necessary measures in daily life. While the creation of knowledge and information is in the process of permanent development, the motivation to adopt sustainable use of the soil and other environment resources is weak. Often scarce capacities are used insufficiently when individual, rather than cross-cutting, solutions are preferred (e.g. Bujnovský et al., 2004). There is tendency to perceive soil protection as a 'competitive issue' or a less significant problem within environmental protection.

Traditionally, policy regulations in hand with the market are considered as major tools for solving current environmental problems (e.g. Nicolaisen et al., 1991; OECD, 2005). In fact, market has limited capacity to solve these problems that can not be solved only by internalisation of external costs, as they have deeper social roots.

More complex view on causes of soil degradation

Despite the broad lack of peoples' willingness to search and solve primary roots of soil degradation (other environment components inclusive) and long-term tendency to ascribe results of human activities to the general global changes, insufficiency of finances or lack of other capacities it is necessary to mention that whatever causes of soil/land degradation are closely related with human thinking and his activities that follows from many literary sources (e.g.. Cairns, 2002, 2003; Engel, Engel, 1992; Gore, 1992; Meadows et al., 1993).

According to Meyer and Turner II (1994), the consumption is considered as a key variable of driving trends and patterns in the human impact on atmospheric deposition, land use, biogeochemical cycles - and so the soil and its quality. Permanent growth of material and energy consumption connected with incomes increase is one of the basic features of a

consuming society and reflects unconcern of individuals about the state of the environment and its improvement. In fact basic economic and social model of human society is based on ownership and controlling of sources, materials, products and services.

There exist more societal forces and phenomena, which directly or indirectly affect state and evolution of the environment, and so they become politically significant. Besides economic, political, social and cultural factors, market, advertising, demographic factors and technical developments, it is necessary to mention human convictions, beliefs, values, attitudes and behaviours at the level of individuals, household, communities and whole public (EEA, 2005; Goodwin et al., 1997; Meadows et al., 1993; Stern, 2000). It is important to point out that the individual groups of driving factors have a different hierarchical position and the common denominator of all these drivers is the satisfaction of human needs.

Kamenetzky (1992) refers to importance to analyse real problems that are masked behind individual needs and wishes. For example excessive use of natural resources only seemingly supplies life conditions of human because in long-term time horizon these conditions get worse. Satisfying of social (e.g. respect, tribute, solidarity, acceptance) and ethical needs (love, truth, fairness, excellence, aesthetics, meaningfulness) usually do not require great amount of market products and services, sometimes none. In fact, more from material needs (e.g. safeness, sureness) is not possible fully satisfy by external products and services.

Causes or factors that finally are projected into immediate reasons of soil degradation and other environmental issues can be generalised into several levels (fig. 1):

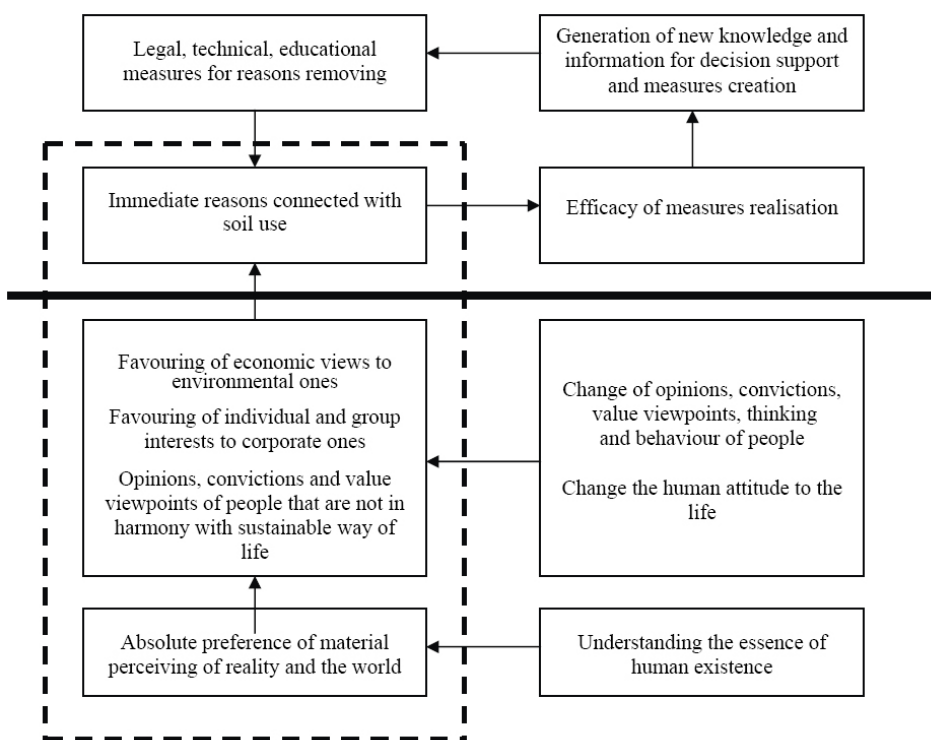
- favouring economic views to environmental ones (sealing of quality soils, negative externalities are not fully incorporated into production costs), preference short term benefits against long-term ones, promotion of excessive consumption as well as permanent need to increase the economic growth of individuals or purpose-built groups
- favouring private and group interests to cross societal ones
- absolute preference of material perceiving of reality and the world when technical progress foreruns the moral, ethical and spiritual evolution of the society.

Till now great part of population is not ready to accept the need of deep analysis of problems related to environment and society because still persists and lives in own ideas, opinions and convictions they identify with. One of ideas, that for long-term liquidates Earth environment is the conviction on insufficiency of issues to cover life demands of all people and following „necessity“ to compete or battle for these issues. From next beliefs, inappropriate from view of sustaining or improvement the existing life quality, belong the next ones:

- the people are separated from each other
- some people are better or valuable than others
- only the most strong can alive
- more material and financial sources is guaranty of better, more safe and more happy life
- people can not satisfy own needs themselves and depends on external help
- it is not possible change basic beliefs and convictions

- it is human nature to behave as he does (negative behaviour, double standard of behaviour)
- there is necessary to maintain and respect age-long traditions that create the identity of the society (alternative ways of life are unrealistic or hardly imaginable)
- it is necessary to maintain and respect long-term traditions that create the societal identity (endless amount of needs and problems is usual part of living standard of people but alternative ways of life seems unrealistic or heavily imaginable)
- the future is to be discounted (it mirrors the preference of short term benefits from natural resource use before the long term ones), etc.

Fig. 1: *Levels of soil degradation causes and measures*

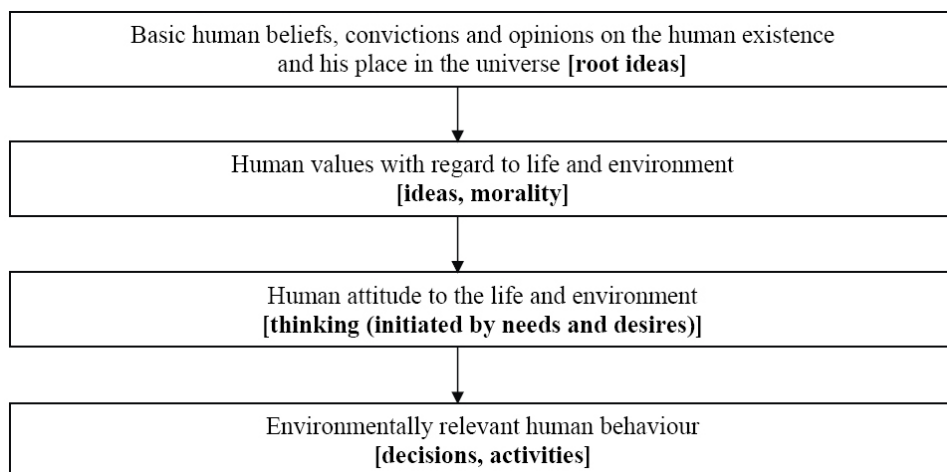


Reverting the process of environmental issues degradation, soil inclusive, assumes improvement or change the formulas of human behaviour, the change of existing way of life and new ways of thinking and acting (Engel, Engel, 1992; Gore, 1992; Meyer, Turner, 1994).

It is necessary to mention that driving force of changes on the Earth (political, economic, societal and environmental ones) is human thinking that permanently creates and changes the reality. Topicality of thinking and human behaviour, as illustrated above, is confirmed by many authors (e.g. Howard, 2000; Stern, 2000). According to these, for most people

more than a simple change in ecological awareness is required. Rather a more fundamental reassessment of basic beliefs and thinking algorithms is needed, because environmentally relevant behaviour is at the end of long causal chain involving a spectrum of personal and relevant factors. As follows from the next simplified scheme (fig. 2), human beliefs and convictions influence behaviour.

Fig. 2: *Hierarchy of causal factors of environmentally oriented human behaviour*



CONCLUSION

In spite of the abundance of information and arguments there is still very difficult to convince majority of citizens as well as most of responsible leaders about the all-societal importance of soils, its degradation and necessity of remedial measurements. **It is important to realise that people should change their lifestyles not because of soil degradation itself or because of the risk of environment destruction but for the sake of their quality of life.**

People have always possibility of free choice (whether conscious or unconscious) through which they change the reality for better or for worse. At the same time we bear the responsibility for decisions we make. Ignoring this fact does not make us immune against laws of nature.

Instead of changing beliefs and opinions which lead to current (often unfavourable) state, people by using political and economical tools keep altering the life conditions including the environment. **What must to happen in order to induce positive changes in the society including improvement of the state of our environment?**

References

- BUJNOVSKÝ, R., ANTAL, J., BALKOVIČ, J., BIELEK, P., BUBLINEC, E., CEBECAUER, T., FULAJTÁR, E., GERGELOVÁ, Z., HOLÚBEK, R., HUBA, M., HRNČIAROVÁ, T., JURÁNI, B., KOVÁČ, K., MINĐÁŠ, J., PAVLENDÁ, P., SOBOCKÁ, J., ŠIŠKA, B., ŠKVARENINA, J., ŠÚTOR, J., THALMEINEROVÁ, D. (2004): National capacity self-assessment related to environmental management of

- global conventions. The thematic assessment report of capacity development needs for the Convention to combat desertification in those countries experiencing serious droughts and/or desertification, particularly in Africa. Ministry of the Environment SR – Ministry of Agriculture SR – UNDP/GEF, 2007, 34 pp.
- CAIRNS, J. JR. (ed.). (2003): Eco-ethics and sustainability ethics. ESSP book 2. Inter-Research, Oldendorf/Luhe, 321 pp.
- CAIRNS, J. JR. (ed.). (2002): Goals and conditions for a sustainable world. ESSP Book 1. Inter-Research, Oldendorf/Luhe, 309 pp.
- DE KIMPE, C.R., WARKENTIN, B.P. (1998): Soil functions and the future of natural resources. In: Blume, H.P., Eger, H., Fleischhauer, E., Hebel, A., Reij, C., Steiner, K.H. (eds.), Towards sustainable land use. Furthering cooperation between people and institutions. Vol. I. Proc. ISCO Conference. Catena Verlag GmbH, Reiskirchen, 3-10, ISBN 3-923381-42-5
- EEA (2005): The European environment - state and outlook 2005. EEA, Copenhagen, 576 pp., ISBN 92-9167-776-0
- ENGEL, J.R., ENGEL, J.G. (eds.) (1992): Ethic of environment and development. Belhaven Press, London, 264 pp., ISBN 1-85293-251-1
- European Commission (1999): Towards environmental pressure indicators for the EU. Brussels, 181 pp.
- European Commission (2006): Proposal for a directive of the European Parliament and of the Council establishing a framework for the protection of soil and amending Directive 2004/35/EC. COM (2006) 232 final. European Commission, Brussels, 30 pp.
- GOODWIN, N.R., ACKERMAN, F., KIRON, D. (eds.) (1997): The consumer society. Island Press, Washington, D.C., 390 pp.
- GORDON, J., VINCENT, D., HABERKORN, G., MACGREGOR, C., STAFFORD-SMISS, M., BRECKWOLDT, R. (2001): Indicators within a decision framework: social, economic and institutional indicators for sustainable management of the rangelands. Report. National Land and Water Resources Audit, Canberra, 113 pp.
- GORE, A. (1992): Earth in the balance. Ecology and the human spirit. Houghton Mifflin Company, Boston, 408 pp., ISBN 0-395-57821-3.
- HOWARD, G.S. (2000): Adapting human lifestyles for the 21st century. American Psychologist 55, 509-515
- KAMENETZKY, M. (1992): The economics of the satisfaction of needs. In: Ekins, P., Max-Neef, M. (eds.), Real-life economics. Understanding wealth creation. Routledge, London, 181-196, ISBN 0-415-07976-4
- LAMBIN, E.F. (2005): Conditions for sustainability of human-environment systems: Information, motivation, and capacity. Global Env. Change 15, 177-180
- LOVELAND, P.J., THOMPSON, T.R.E. (eds.) (2002): Identification and development of set of national indicators for soil quality. R&D Project Record P5-053/PR/02. Environment Agency, Bristol, 170 pp., ISBN 1-85705-667-1.
- MEADOWS, D.H., MEADOWS, D.L., RANDERS, J. (1993): Beyond the limits. Earthscan Publications Limited, London, 300 pp., ISBN 1-85383-131-X
- MEYER, W.B., TURNER, B.L. (1994): Changes in land use and land cover: a global perspective. Cambridge University Press, Cambridge, 537 pp., ISBN 0-521-47085-4

- NICOLAISEN, J., DEAN, A., HOELLER, P. (1991): Economics and the environment: A survey of issues and policy options. OECD Economic Studies No. 16, 43 pp.
- OECD (2005): Trade that benefits the environment and development. Opening markets for environmental goods and services. OECD Publications, Paris, 180 pp., ISBN 92-64-03577-X
- STERN, P.C. (2000): Psychology and the science of human-environment interactions. *American Psychologist* 55, 523-530
- VANCAMP, L., BUJARRABAL, B., GENTILE, A.R., JONES, R.J.A., MONTANARELLA, L., OLAZABAL, C., SELVARADJOU, S.K. (2004): Reports of the technical working groups established under the thematic strategy for soil protection. EUR 21319 EN/1-6. Office for official publications of the European Communities, Luxembourg, 872 pp.
- YAALON, D.H., ARNOLD, R.W. (2000): Attitudes toward soils and their societal relevance: Then and now. *Soil Science* 165, 5-12.

Acknowledgement: This work was supported by the Slovak Research and Development Agency under the contract No. APVV-0124-06.

ANALÝZA PRÍČIN DEGRADÁCIE PÔDY

Zhrnutie

Degradácia pôdy patrí k významným problémom tak na globálnej aj environmentálnej úrovni a úzko súvisí s ďalšími environmentálnymi a spoločenskými problémami akými sú výskyt záplav a sucha, nedostatok a kvalita potravín a vody s priamym dopadom na vývoj zdravotného stavu populácie.

Bezprostrednými príčinami degradácie pôdy v poľnohospodárstve (a čiastočne aj v lesnom hospodárstve) je nedostatočné uplatňovanie zásad správnej poľnohospodárskej resp. lesohospodárskej praxe a považovanie pôdy za výrobný prostriedok, ktorý slúži užívateľovi pre dosahovanie hospodárskeho zisku. Hospodárske aktivity človeka ovplyvňujú kvalitu pôdy nielen v priemyselných a urbánných oblastiach (predovšetkým zhutňovanie a znečisťovanie pôdy), ale aj pôdu v poľnohospodárskom a lesnom sektore (najmä acidifikácia a znečisťovanie pôdy). Pôda v súkromnom vlastníctve je spravidla považovaná za prostriedok ktorý slúži *výlučne* záujmom vlastníka.

Vyššie uvedené odzrkadľuje spoločenské hodnoty, postoje, presvedčenia, viery, dispozície, motivácie, priority, želania, správanie, ktoré sú v pozadí výsledkov vývoja spoločnosti a životného prostredia. Uprednostňovanie ekonomických hľadísk pred environmentálnymi, individuálnych a skupinových záujmov pred celospoločenskými, krátkodobých ziskov pred dlhodobými, podporovanie nadmernej spotreby ako aj trvalá potreba ekonomického rastu jednotlivcov a účelových skupín - to všetko predstavuje skryté hybné sily degradácie pôdy, ktoré treba zohľadňovať pri zabezpečovaní udržateľného využívania pôdy.

Recenzovali: Prof. h.c. prof. Ing. Ondrej Hronec, DrSc.
Prof. Ing. Jozef Vilček, PhD.

THEORETIC-METHODOLOGICAL BASICS OF PHYSICAL-GEOGRAPHICAL REGIONALIZATION AND ITS REFLECTION IN SELECTED REGIONAL PIECES OF WORK OF SLOVAK GEOGRAPHERS

Vladimír ČECH¹

Abstract: *The aim of the presented conference paper is a brief characteristic of a major part of theoretic-methodological basics of physical-geographical regionalization on the basis of pieces of work of Slovak geographers. Second part deals with the characteristic of selected pieces of work of Slovak geography representatives*

Key words: *physical-geographical regionalization, region, regionalization*

PREFACE

Physical geography handles an important and typical space aspect of studying the pursued phenomenon, i.e. phenomena are examined (including landscape) with their content and space aspect. An important indication is phenomena and physical-geographic landscape spatial differentiation and its regularities. According to Ořahel' (1978), regularities of spatial differentiation are the most important theoretical basics of physical-geographical regionalization. The reflection of spatial differentiation objective regularities is physical-geographical regionalization unit system which is, to certain extent, marked with an individual approach of an author (choice of criteria, borders). Physical-geographic regionalization is a process of learning specific characteristics of physical-geographic sphere, specifically its continuity as well as discretion. The existence of physical-geographic regionalization process is a consequence of objective existence of physical-geographic complexes (regions), i.e. parts of physical-geographic sphere which are mutually bounded and differ both qualitatively and quantitatively.

The problems of physical-geographic regionalization resonated especially in the 50s and 60s. In this area, Russia, former DDR and later Poland and Slovakia were the main centers of development. Formularization of theoretic-methodological basics was primarily a matter of Russian geographical school, e.g. work of Armand (1964, 1970), Fedina (1973), Isačenko (1953, 1967, 1991), Petrov (1991), Michajlov (1985), Beručašvili-Žučková (1997), Rodoman (1965). Out of German writing authors can be mentioned Haase (1991), Fischer (1982). Anglo-american literature is represented for instance by Grigg (1965), Spence-Taylor (1970). Polish geographical school includes Kondracki (1976). Slovak authors dealing with these problems in more details are for example Mičian (1971, 1984, 1990), Drdoš et al. (1981), Košťálík (1985), Michal (1997), Lauko (1990), Bezák (1993), Minár et al. (2001).

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*

Despite the fact that the question of physical-geographic regionalization is not the most important for Slovak geographers nowadays, it occupies an irreplaceable position in Slovak geographical school. Some significant Slovak geographers started on the basis of physical-geographic regionalization and at present some regional physical-geographic pieces of work still end in this way.

TERMS REGION AND REGIONALIZATION

Before clarifying the term physical-geographic regionalization a few words about the terms region and regionalization are needed.

Region is a central term of regional geography and, at the same time, an object of its study. The prototype of this term was, according to Lauko (1990), a Latin term *regio* which means kingdom. In his opinion the development of this term's conception changed from its interpretation of political-historical territorial unit (18th cent.) through deterministic or ideological concept (19-20th cent.), possibilistical (beg. of 20th cent.), individualistic to treating the region on the basis of its complexity and synthesis aspect. Taking this into account, **region** is understood as a complex spatial unit of varied taxonomical level which consists of elements of natural and socioeconomic structure. Its individuality is determined by a certain essential sign which makes the region differ from neighboring areas.

In geography in general, on the basis of the work of *Mičian* (1971, 1984, 1990), regions can be divided into **3 categories** according to **contents**:

a) **physical-geographic regions** which contents are physical-geographic complexes or their components. Within physical geography they are delimited according to the criteria selected from the components of physical-geographic sphere, e.g. from georelief, soil cover, climatic parameters of atmosphere, plant cover, etc.

b) **economy-geographical** or **socioeconomical regions** which contents are socioeconomical systems or their components and within socioeconomical geography are defined according to the criteria selected from the components of socioeconomical sphere.

c) **complex, integral** or simply **geographic regions** which delimitation should be a competence of complex, integral regional geography. The borders of these regions are the same as of the socioeconomic-geographical regions.

Regions can be interpreted as following [Lauko (1990) a *Mičian* (1990)]:

1. individual regions (unrepeatable)
2. typological regions (parts of certain type)

With **individual regions** are important their individual, unrepeatable qualities. For the reason of not repeating, individual region usually has its own name or other specific sign (e.g. mining region Štiavnické vrchy or only name: the Alps). From cartographic point of view, each individual region marked on the map has its own mark in the legend. Individual region has an exact location given by coordinates.

In connection with **typological regions**, their general common signs are predominantly emphasized; qualities which are repeated in many delimited areas. Their names should give a true picture of pursued mutual signs (e.g. mountain areas of Europe).

Regionalization can be perceived in two different ways: as a **process** and as a **state** (*Mičian* 1971, 1984). Regionalization as a **process** is a delimitation of territorial and aquatorial units having some common sign and their separation from those territories

(aquatories) which do not have it. This sign is the basis of separation, delimitation and it is called regionalization criterion. The one, who carries out the regionalization, selects the criterion as well. Regionalization as a **state** is a result of a regionalization process and has a form of a map on which regions are delimited.

According to contents (object, i.e. what we regionalize) we distinguish (*Drdoš et al. 1981*):

- a) **physical-geographic regionalization** which object is physical-geographic sphere or its components
- b) **human-geographic regionalization** (in the past – socio-economic-geographical regionalization) which object is human-geographic sphere or its elements
- c) **total geographic regionalization** which object is landscape sphere (geosphere)

TERM PHYSICAL-GEOGRAPHIC REGIONALIZATION

According to *Mičian (1984)*, the definition of physical-geographic regionalization is, strictly speaking, identical with general definition of regionalization; it is only narrowed to physical-geographic sphere or the choice of regionalization criteria is limited to the components of physical-geographic sphere. Consequently, he claims that physical-geographic regionalization as a process is a delimitation of natural territorial (aquatorial) units (i.e. parts of physical-geographic sphere) having some common sign selected only from the components of physical-geographic sphere and their isolation from those territories (aquatories) which do not comprise this sign.

Concerning **contents** (according to *Drdoš et al. (1981)*, *Mičian (1971, 1984, 1990)* and *Michal (1997)* physical-geographic regionalization can be divided into:

a) **sectoral (component, partial) physical-geographic regionalization**, where relevant components are the determining criteria, which results in climate-geographic, hydro-geographic, pedo-geographic, plant-geographic regionalization.

b) **complex physical-geographic regionalization** which contents are physical-geographic systems (complexes) with the determining criteria of signs of physical-geographic complexes that can alter, depending on taxonomical level. These signs can correspond with single physical-geographic components. *Michal (1997)* shows as an example a procedure where on the first regionalization level is used a criterion selected from the geo-relief character, on the second level from a vegetation character, on the third level from lithosphere, then pedosphere, etc. It is actually a simple way of physical-geographic synthesis. Examined region is delimited by overlapping single analytical maps.

According to **forms (modes)** are distinguished following couples of regionalization:

a) **Individual and typological regionalization** (*Drdoš et al. 1981*; *Košťálik 1985*, *Lauko 1990*; *Mičian 1984, 1990*; *Michal 1997*; *Ořahel 1978*)

Individual regionalization represents delimitation of individuals, spatial areas (physical-geographic complexes) which carry the sign of territorial integrity. They are labeled as regions and on the lower level as sub regions. From formal-cartographic perspective, individual (or own) regionalization is where each shape (area) on the map has its special individual characteristic in the text and one explanatory note in the map legend refers only to one shape on the map.

Typological regionalization (**typization**) is a delimitation of physical-geographic complexes which do not possess the sign of territorial integrity, they are repeatable.

Physical-geographic complexes represent delimited types in a hierarchical manner. Typological regionalization is when one characteristic refers to more shapes on the map.

Newer frame of reference concerning individual and typological regionalization brought *Bezák (1993) a Minár et al. (2001)*. They label contents classification (creating class on the basis of internal characteristics analogy disregarding spatial neighborhood) of already delimited elementary map geo-ecological units as **geo-ecological** (complex physical-geographic regional) **typization**. Individual delimitation (spatial classification where neighboring relations play an important part) and individual characteristic of geo-ecological units are called **geo-ecological** (complex physical-geographical) **regionalization**.

b) **Single-level and multi-level regionalization** (*Drdoš et al. 1981; Lauko 1990; Mičian 1984, 1990; Michal 1997*).

Single-level regionalization lies in the delimitation of one taxonomical level of regions. Multi-level (more-level) regionalization grounds in singling out more taxonomical levels of regions.

c) **Simple and complex regionalization** (*Drdoš et al. 1981, Lauko 1990; Mičian 1984*).

Simple regionalization is created by using only one scheme of regionalization, one type of criteria – e.g. only zonal or azonal.

Complex regionalization results from using zonal and azonal regionalization in the same area. As a consequence of mutual intersection of borders zonally and azonally delimited regions, new hybrid regions are created which, concerning initial regions, form regions of lower taxonomical level.

d) **Zonal and azonal regionalization** (*Drdoš et al.. 1981; Mičian 1984, 1990; Michal 1997*).

At zonal regionalization we delimit units on bioclimatic condition, i.e. zonally (horizontal, foothill, vertical zones). At azonal regionalization we delimit units on hydro-substrate-geomorphological condition, i.e. not in a zonal matter (e.g. mountain range, basin, heights, plain, fluvial region, terrace region, etc.).

Mičian (1984, 1990) distinguishes **general-scientific** and **applied** physical-geographic regionalization. Maps of general-scientific regionalization often reflect the past; they present genetically homogeneous reconstructed complexes and often do not pay attention to what these complexes represent nowadays. Applied physical-geographic regionalization maps are focused into the future; they have to reflect not only current state of complexes, but also their future state and behavior which will be determined both by natural processes and character of interaction with relevant type of human activity. In the first case, the object of research is physical-geographic complex itself (and only it); in the second one – system of the kind: ‘complex – a type of activity’ or ‘complex – technical work’.

Regionalization is carried out in two basic methods (*Drdoš et al. 1981; Lauko 1990, Mičian 1971, 1984, 1990*)

a) **deductive approach ‘from the top to the bottom’**, i.e. by dividing bigger units into smaller ones. Theoretically, this method is possible from physical-geographic sphere to ‘geotop’ – representing the smallest complex and at the same time cartographic physical-geographic unit,

b) **inductive approach ‘from the bottom to the top’**, i.e. making groups, joining smaller units (e.g. geotops and their complexes) into bigger units.

METHODS OF PHYSICAL-GEOGRAPHIC REGIONALIZATION

Physical-geographic regionalization grounds on certain methods among which the most known and used are (*Drdoš et al. 1981; Mičian 1984*):

a) The method of map superposition of partial physical-geographic regionalizations.

A map series of regionalization of single natural components is used, i.e. individual or typological component regionalization, e.g. map of geomorphological, litogeographical, pedogeographical, climageographical, etc. regionalization. Optimal condition is if all ground maps are of the same scale. However, in real we usually have maps of some components and very often in different scales. Every time we try to gain a map of pedological or pedogeographical typization or individual regionalization, because soil as a mirror and memory of landscape reflects the overall character of physico-geographic regions very well. Moreover, pedological maps contain information about substrate, i.e. geological ground of soils. A significant matter is a topographical or already a geomorphological map as for the borders of many physico-geographic regions are overlapping with the borders of geomorphological units. The method lies in borders lines comparison of single component regions or territorial types. We can 'superpose' maps if we have them on the transparent paper in the same scale. Those parts where the borders of more component regions (types) overlap can be considered as a border of complex physico geographic region. In the parts where the component borders diverge more significantly, as a border of complex physico geographic region we have to take one of them. These problematic border segments are verified in the field by thick (step) feeler [according to *Minár (1998)*]. This procedure is manageable from organizational point of view, however, it has some drawbacks. To different extent, mapped components are immediately visible (on one hand an easy follow of real vegetation and geo-relief, on the other hand, lithosphere or pedosphere only through feelers and uncovers) and are characterized by various dynamics of pursued status qualities (relatively static lithosphere and geo-relief, and maximally changeable atmosphere or hydrosphere) which influences different degree of spatial accuracy of component maps. At simple superposition of these maps the result is weighed down by a mistake accounting for the least accurate spatial ground. The effect of integrated research disappears, which immediately takes into account correlation relations between attributes of different landscape elements.

b) The method of leading factor (*Drdoš et al. 1981; Mičian 1984*).

On each taxonomical level we select one leading factor and according to it we lead the borders. However, the leading factor may change. Such an example presents *Mičian (1984)*: When delimiting the units of the first order the leading factor we choose is geo-relief. On the basis of geomorphological regionalization map we delimit e.g. fluvial and mountainous region (the regions of the first order). In the mountainous region, on the basis of pedological regionalization map, we delimit e.g. region with prevailing cambisols on granite and region with prevailing rendzinas on limestone (regions of the second order). For another division we use e.g. vegetation-geographical region map: in both previous regions we delimit e.g. regions with prevailing community of oak degree and regions with prevailing community of beech degree (regions of the third order).

Both methods use deductive approach - 'from the top to the bottom'.

c) The method of delimiting regions on the basis of physical-geographic complexes typological maps (*Drdoš et al. 1981; Mičian 1984*).

The way of making groups is used at this method, the process from the bottom to the top, i.e. inductive approach. At first a geotop map is created and, by making groups of them, nano-, micro-, mezzo- and macrochoras are formed.

According to *Mičian (1984)*, we make groups, join neighboring physical-geographic complexes (their areas) in bigger and bigger groups, taking into account some common sign by what we form complex physical-geographic units – regions according to the pattern ‘from the bottom to the top’. An important and frequent criterion of making groups is the relief character, e.g. we join various areas in one region according to the position on riverine plain, on incline of certain exposition, on plateau, etc.

Currently the basic and acknowledged method of physical-geographic research, which results in physical-geographic regionalization, is a **complex physical-geographic (stand) analysis on the geographical point** (tessera) – so called Swiss-German method. These geographical (research) points have to be sufficiently representative, i.e. they should include e.g. various forms of geo-relief, soil sub types, etc. On such checkpoint physical-geographic differential and complex analysis and, consequently, synthesis is realized. An example of using the method of complex stand analysis and synthesis in topical dimension is the work of *Scholz a i. (1979 in Drdoš, 1999, s. 77)*.

Methodology grounds in these three steps:

1. **Geo-topological differential analysis** – at this step, available materials about landscape components of territory are assessed (geological, geomorphological, pedological, hydrological, climatical, botanical or silvicultural) and filled in by the results from the field research. The outcome is sign characteristics of individual landscape components (e.g. elements and forms of georelief, character of substrate, etc.) series of thematical sign maps and charts (the results of measurements).
2. **Geo-topological complex analysis** – at first mosaic of stands on studied area is made by observation (on the basis of the results of geo-topological differential analysis). The aim is to find out the combinations of landscape components on the representative points of stand, which allows to grasp the system of their mutual relations and mutual activity. The points have to be ordered in lines which intersect typical stand places in order to delimit the geocomplexes accurately.
3. **Geo-topological synthesis** – complex geo-topological analysis enables to order sign combinations of geocomplexes and, subsequently, homogeneous areas – geotops (ecotops) can be set up.

The data about research points in final form provide card indices of research points. However, these research points miss spatial dimension, therefore, it is necessary to create individual homogeneous spatial physical-geographic complexes (IHSPGK) of the geotop (ecotop) character. The areas of these complexes are separated according to the data obtained in the field from research points and other fundamentals. The borders are determined in compliance with the significant changes of main differential factor – mostly geo-relief, soil sub types, etc. or significant change of more studied characteristics. On the basis of character affinity (common signs) of more IHSPGKs, physical-geographic typization is realized by making groups into the types of homogeneous spatial physical-

geographic complexes (THSPGK). It is possible to make groups of these types into more taxonomical levels.

PHYSICAL-GEOGRAPHIC REGIONALIZATION IN SELECTED PIECES OF WORK OF SLOVAK GEOGRAPHERS

Problems of physical-geographic regionalization are in Slovak geography in theoretic-metodological as well as in practical form well-developed in numerous pieces of work of different authors. There were published many regional pieces of work dealing with physical-geographic regionalization in real area. For the paper needs we selected them according to individual authors. The focus in analyses is on selected criteria of delimiting physical-geographic types or regions, number of taxonomical levels and territorial units which were the object of regionalization.

Barčáková (1998) deals with geoecological typization of Turčianska kotlina basin part.

Cebecauerová (1997) determines the types of physical-geographic complexes of natural landscape in selected parts of Borská nížina lowland and Chvojnická pahorkatina heights.

Čech (2003) characterizes physical-geographic complexes of SE part of Galmus mountain range on 6 taxonomical levels. Crucial differential factor of physical-geographic sphere is geo-relief and its forms and partly geo-relief exposition, rock composition and hydrological situation. Another piece of work *(2004)* deals with physical-geographic complexes of Červené skaly national nature reservation in Galmus mountain range on 5 taxonomical levels defined predominantly according to the forms and exposition of geo-relief and rock composition.

Drdoš dealt with physical-geographic typization or regionalization in several pieces of work (e.g. 1967, 1968, 1975, 1977, 1979, 1982, 1988, 1989, 1990, 1994a, 1994b, *Drdoš-Žudel* 1984, *Drdoš et al.* 1994). Depending on physical-geographic heterogeneity and the area size (ranging from the landscape area of basin to land register), he defined different numbers of landscape types on several taxonomical levels. The most frequent differential factors in studied areas (such as Slovak karst, Košická kotlina basin, Liptovská kotlina basin, Zvolenská kotlina basin, land register of Očová, Detva, etc.) were geological composition (basic differential factor of vast areas), geo-relief, geomorphological processes, morphometric characteristics of geo-relief, soil, underground water and potential vegetation. Differential factors may be applied in different ways on various taxonomical levels. However, geo-relief is a universal differential factor applied in all taxonomical levels. In the western part of the Liptovská kotlina basin he delimited (homogeneous units) taxons of natural character (according to the potential vegetation) on the lowest hierarchical level and on the basis of their current use he delimited human variants (categories of land use).

Typology of basic choric structures of Zlaté Moravce area and its hinterland presents *Drgoňa (1983)*. He distinguishes two major typological criteria: physiosystems combinations complexes (on the first level substrate and pedological qualities, second level of physical-geographic processes types) and the complex of physiotops combinations (geomorphological forms). Another paper *(1988)* aims at characteristic of geoecological types in Tribeč mountain range part Ponitrie protected landscape area where he distinguishes

4 taxonomical levels: 3 groups of types, 5 types, 11 sub types and 20 varieties. The main differential factors are: the type of geo-relief and its morphometris characteristic, original plant cover, soil hydromorphism, process dynamics, etc.

Typization of physical-geographic systems, subsystems, complexes of subsystems and subsystems of Nové Mesto nad Váhom area can be found in *Feranc's* work (1978). The author distinguishes 3 taxonomical levels. There are 3 individual systems on the highest level: Podunajská nížina lowland, Malé Karpaty mountain range, Považský Inovec mountain range. On the second level within each system he recognizes 2 subsystem complexes according to the geo-relief. On the third level were delimited 12 subsystems on the basis of substrate, geo-relief, soil composition and potential vegetation.

Having geo-relief as a dominant factor, *Harčár* (1972) delimits 3 basic landscape units within one level in Šarišská vrchovina mountain range. *Harčár a i.* (1982) realized physical-geographic regionalization of Prešov district into 2 taxonomical levels. Higher level is formed by 10 macrochores rooting from individual geomorphological units of Slovakia. Lower level consists of 21 mezzochores sourcing from substrate- geomorphological, climate and soil composition and potential vegetation.

Kandová (Michaeli) - Karniš - Košťálik (1970) delimit 3 physical-geographic regions of Pieniny according to the geo-relief. Another piece of work [*Kandová* (1973)] delimits complexes and groups of ecotop complexes on profile belt of Liptovská kotlina basin. Geo-relief was the dominant differential factor on the basis of which author defined 4 groups of ecotop complexes. Moreover, the first group was divided into 5 ecotop complexes according to geomorphological composition.

Kandráčová - Michaeli (1987) divide the land register of Drienovská Nová Ves into 8 physical-geographic microregions on the basis of substrate and geo-relief.

Kolény (1997) analyses physical-geographic complexes in surroundings of Malacky – Modra – Pezinok – Senec areas.

Geocological nature landscape types of Stará Ľubovňa district occur in *Košťálik's* work (1980, 1982, 1984, 1985).

Kroupová (1976) carried out physical-geographic regionalization on profile area of middle part in Malé Karpaty mountain range. Total number of ecotopes (200) was joined into 43 types of ecotopes. On the first level she merged the ecotopes into microchores working on the similarity of geo-relief, geological composition, soils and vegetation. In such way she obtained 30 microchores which belong into 23 types. On the second level she united microchores regarding their membership to tectonic-morphological mezzstructures – she gained 8 types of mezzochores. On the third level she joined mezzochores into 2 individual macrochores: Záhorská nížina lowland and Malé Karpaty mountain range.

Lehotský (1991) delimits geocological types of Štiavnické vrchy mountain range landscape on 6 taxonomical levels where the dominant differential factors are: geo-relief (energy, form), soils (sub type or variety, depth, sort) and reconstruction plant community.

Physical-geographic regionalization of Jur pri Bratislave landscape is presented in the work of *Lukniša* (1977). The author defines 5 taxonomical levels. The dominant criterion is geo-relief, underground water, potential vegetation and soil.

Mazúr (1971) deals with the typization of Slovak karst. The main differential factor is geo-relief, climate, soils and vegetation are attached signs. The area is divided into

3 taxonomical levels. (*Mazúr a i. 1977*) delimit geoecological (natural landscape) types of Slovakia on 4 taxonomical levels according to the geo-relief, substrate, climate, underground water, soils and vegetation. Delimitation of natural landscape types of the eastern part of Zvolenská kotlina basin can be found in work of *Mazúr a i. (1979)*. Within three-level classification according to geo-relief, the authors distinguish on the highest level 4 basic geoecological landscape systems, on the second level, rooting from geo-relief, climate and potential vegetation, 9 groups of geoecological landscape types and on the lowest level 27 geoecological landscape bound to geo-relief, substrate, soils and biota. In Atlas of Slovak socialistic republic *Mazúr a i. (1980a,b,c,d)* presented 4 geoecological maps focused on the Slovak territory, Žilinská kotlina basin, Záhorská nížina lowland and Slovak karst. In another piece of work (*Mazúr a i. 1985*) are stated the types of Tatranská Lomnica nature area on 3 taxonomical levels. The dominant differential factor is geo-relief which conditions the differentiation of the landscape into the mosaic of special systems. In natural landscape structure on the highest taxonomical level the authors define 3 landscape units; on lower taxonomical level 8 landscape types; on the lowest taxonomical level the dominant factors are geo-relief, soils and vegetation which was the base for delimitation of 46 landscape sub types.

Physical-geographic regionalization of Borská nížina lowland is well-developed in *Mičian-Plesník's* paper (*1981*). The authors applied individual regionalization by use of which they defined 4 regions of the first order (area) and on the lower taxonomical level were created 12 sub units. *Mičian - Zai'ko (1990)* delimited the types of natural-landscape complexes of the eastern part of Horehronie. The two-level classification contains on the highest level 2 individual units: Horehronské podolie basin and its surrounding mountain rim; on the second level 34 physical-geographic complexes with geo-relief as the dominant criterion.

Geoecological types in the Východné Karpaty biospheric reserve and the upper part of the Zboj Creek catchment area can be found in *Midriak (1997a,b)*.

Michaeli deals with physical-geographic regionalization in several papers which concern Hornádska kotlina basin and its surrounding mountain rim (*1976, 1980, 1983, 1985*). In these papers the author frequently joins geotops into bigger units regarding their substrate-morphological signs, soils and vegetation similarity. *Michaeli - Kandráčová (1982)* divided the Medzany land register into 4 types of physical-geographic microregions according to the geo-relief, soils and potential vegetation. *Michaeli - Kandráčová (1985)* define 5 types of physical-geographic microregions of the Šarišské Michal'any land register taking the geo-relief as the dominant differential factor.

Michal (1976) realized the physical-geographic regionalization on the profile of part of the Nízke Tatry mountain range, Zvolenská kotlina basin and Kremnické vrchy mountain range. On the lowest level he delimited 47 ecotopes which he joined on the second level according to the geo-relief, exposition and altitude into 14 microchores. The third level is presented by 3 mezzochores (delimited on the basis of geo-relief, substrate and vegetation level) and the fourth level by 3 macrochores – individual geomorphological wholes (Nízke Tatry mountain range, Zvolenská kotlina basin and Kremnické vrchy mountain range).

Miklós (1978, 1983) develops the physical-geographic regionalization of Gemerské Turce catchment.

Physical-geographic regionalization of Liptovská kotlina basin is to be found in *Oťahel's* paper (1978, 1982). In the first paper the typization was based on an azonal principle and regularities of detailed differentiation of physical-geographic sphere which conditioned hydrological- substrate-geomorphological composition. He also applied genetical principle and complex principle. He distinguishes 5 taxonomical levels. In the 1982 paper the author presents 3 basic types of Liptovská kotlina basin nature landscape delimited according to the geo-relief, vegetation and soils. *Oťahel' - Poláčik* (1987) defined on the basis of geo-relief, potential vegetation and soils 3 basic complexes of the types of physical-geographic complexes of Liptovská kotlina basin and on the lower taxonomical levels the main criteria were: geo-relief, underground water and climate. Natural landscape types of Bratislava and Nitra area can be found in *Oťahel'-Žigrai-Drgoňa's* paper (1993). *Oťahel'-Lehotský-Ira* (1997) worked on the natural landscape structure of Kraľovany and Podtatranská kotlina basin area. In the three-level classification, the dominant differential factors on the highest level are geo-relief, underground water and climate; on the two lower levels are added soil and substrate composition as well as potential vegetation. *Oťahel' - Feranec* (1997) delimited natural landscape types of Záhorská nížina lowland on 3 levels taking into account geological- substrate, geo-relief, potential vegetation and soil composition. Natural landscape types of the western part of Liptov region on 5 taxonomical levels are dealt with in *Oťahel' – Feranc's* paper (1998).

The basic factors of typization are: geological- substrate composition, geo-relief, soil, hydrological, climate composition and potential vegetation. Geoecological structure of Slovakia on 4 taxonomical levels is elaborated in *Oťahel's* paper (2000).

Ružička – Drdoš - Ružičková (1974) delimited types of abiotic complex in Bratislava-Lamač area.

Šeliga (1978) deals with the characteristic of microchores and ecotops of the physical-geographic complex of the middle part of Záhorská nížina lowland. He delimited 17 ecotops which were put into groups on the hydrological- substrate-geomorphological signs.

Within one level *Tremboš - Minár* (1997) identified 49 abiotic complexes of Kluknava land register on the basis of the information about lithosphere, geo-relief, pedosphere and hydrosphere.

It is obvious that frequently regionalized area is a land register and its hinterland, profile belt crossing several geomorphological wholes, combination of contrast areas (mountain range – basin, mountain range – lowland) or simply complete geomorphological whole of its part. The most frequent differential factor is geo-relief, which is the most often condition applied in the process of physical-geographic regionalization and according to which the borders of physical-geographic units are made; other factors are less used. Concerning the number of taxonomical levels, the multi-level regionalization is used the most often.

SUMMARY

Physical-geographic regionalization generally represents final part of detailed physical-geographic analysis of the selected area and its partial components. This method is still often used in order to obtain complex synthetic overview of the studied area. It provides us with an outline of the area regarding its heterogeneity or relations between partial units. Brief analysis of selected regional papers of Slovak geographers points at its significant role at the physical-geographic research of the landscape.

Acknowledgement: This paper was prepared with the contribution of the grant: VEGA 1/4028/07 „Skúmanie a geoeologické hodnotenie zmien využívania kultúrnej krajiny vybraných podhorských regiónov Slovenskej republiky“.

References

- ARMAND, D. L. (1964): Logičnosť geografických klasifikácií i schem rajonirovanija. In: Razvitie i preobrazovanie geografickej srody. Zborník. Moskva : Nauka
- ARMAND, D. L. (1970): Objektivnoje i subjektivnoje v prirodnom rajonirovanii. In: Izvestija AN, serija geograf., 1, Moskva
- BARČÁKOVÁ, I. (1998): Geoeologická typizácia časti Turčianskej kotliny. In: Acta facultatis studiorum humanitatis et naturae Universitatis Prešovensis, Folia geographica 2. Prešov: FHPV PU, s. 152-159. ISBN 80-88722-44-6
- BERUČAŠVILI, N.L., ŽUČKOVA, V.K. (1997): Metody kompleksnyh fiziko-geograficheckih issledovanij. Moskva: Izdatel'stvo Moskovskogo Universiteta, 1997. 319 s. ISBN 5-211-03502-X
- BEZÁK, A. (1993): Problémy a metódy regionálnej taxonomie. In: Geographia Slovaca 3. Bratislava: GÚ SAV, 98 s. ISSN 1210-3519
- CEBECAUEROVÁ, M. (1997): Typy a genéza prírodnej krajiny (na príklade vybranej časti Borskej nížiny a Chvojnickej pahorkatiny). In: Geographia Slovaca 12. Szöllös, J. red. Bratislava: GÚ SAV, s. 27-36. ISSN 1210-3519
- ČECH, V. (2003): Fyzickogeografická regionalizácia juhovýchodnej časti pohoria Galmus. In: Acta facultatis studiorum humanitatis et naturae Universitatis Prešovensis, Folia geographica 7. Prešov: FHPV PU
- ČECH, V. (2004): L'évaluation geocologique de la Reserve Naturelle Nationale de Červene Skaly dans les Montagnes de Galmus. In: Krzemien, K. ed.: Les Transformations du Milieu Montagnard-Carpates, Massif Central et Autres Montagnes D'Europe. Prace Geograficzne, tome 113, Krakow, s. 73-84. ISSN 1644-3586
- DRDOŠ, J. (1967): Typizácia krajiny vo východnej časti Slovenského krasu a v príľahlej časti Košickej kotliny. In: Quaestiones geobiologicae 3 (Problémy biológie krajiny 3). Bratislava: VEDA SAV, s. 5 – 119.
- DRDOŠ, J. (1968): Príspevok k riešeniu problematiky biológie krajiny v oblasti Turne nad Bodvou. In: Quaestiones geobiologicae 5 (Problémy biológie krajiny 5). Bratislava: VEDA SAV, s. 9 – 101.
- DRDOŠ, J. (1975): Typizácia abiotického komplexu nivy Váhu medzi Liptovskou Teplou a Liptovským Hrádkom. In: Quaestiones geobiologicae 18 (Problémy biológie krajiny 18). Bratislava: VEDA SAV, s. 5–43.
- DRDOŠ, J. (1977): Komplexná fyzickogeografická analýza západnej časti Liptovskej kotliny. In: Acta geobiologica, roč. 6, č. 13, s. 1–127.
- DRDOŠ, J. (1979): Štruktúry prírodných krajinných komplexov v západnej časti Liptovskej kotliny. In: Acta Facultatis Rerum Naturalium Universitatis Comenianae, Geographica, roč. 17, s. 81–101.
- DRDOŠ, J. (1982): Krajinná syntéza pre modelové riešenie Tatranskej Lomnice a jej zázemia. In: Zborník prác o TANAPe, roč. 23, s. 233–256.
- DRDOŠ, J. (1988): Krajinné prostredie Detvy a jeho premeny. In: Geografický časopis, roč. 40, č. 4, s. 284–310.

- DRDOŠ, J. (1989): Únosná návštevnosť krajiny v Tatranskom národnom parku. In: Zborník prác o TANAPe, roč. 29, s. 191-237.
- DRDOŠ, J. (1990): Príspevok k problematike únosnosti krajiny (na príklade Tatranského národného parku). In: Geografický časopis, roč. 42, č. 1, s. 3 – 22.
- DRDOŠ, J. (1994a): Natural environment and its utilization in Upper Nitra region. In: Geographia Slovaca 6. Drdoš, J. – Szöllös, J. red. Bratislava: GÚ SAV, s. 125-136. ISSN 1210-3519
- DRDOŠ, J. (1994b): Príspevok k funkčnému hodnoteniu prírodnému a urbárneho prostredia pre účely environmentálneho plánovania (Bystričany). In: Geografický časopis, roč. 46, č. 1, s. 17-34. ISSN 0016-7193
- DRDOŠ, J. (1999): Geoekológia a environmentalistika – I. časť. Krajinná ekológia – geoekológia, krajina, životné prostredie. 1. vyd. Prešov: FHPV PU, 153 s. ISBN 80-88722-69-1
- DRDOŠ, J., ŽUDEL, J. (1984): Očová – rodisko Mateja Bela. In: Geografický časopis, roč. 36, č. 1, s. 34-59.
- DRDOŠ, J. et al. (1981): Krajina – jej racionálne využívanie a ochrana – II. časť. 1. vyd. Bratislava: PriF UK, 165 s.
- DRDOŠ, J. et al. (1994): The Upper Nitra region: man and his environment. In: Geografický časopis, roč. 46, č. 2, s. 131-148. ISSN 0016-7193
- DRGOŇA, V. (1983): Formovanie základných chorických krajinných štruktúr: geoekologické prístupy. In: Geografický časopis, roč. 35, č. 4, s. 353-373.
- DRGOŇA, V. (1988): Geoekologická štruktúra trbečskej časti CHKO Ponitrie. In: Rosalia. Spravodaj ochrany prírody okresu Nitra a CHKO Ponitrie, č. 5, s. 47-57.
- FEDINA, A.E. (1973): Fizikogeografičeskoe rajonirovanie. Izdatel'stvo Moskovskogo universiteta, Moskva
- FERANEC, J. (1978): Analýza narušenia fyzickogeografických systémov v okolí Nového Mesta nad Váhom. In: Geografický časopis, roč. 30, č. 2, s. 150-170.
- FISCHER, M. M. (1982): Eine Methodologie der Regionaltaxonomie. In: Bremer Beiträge zur Geographie und Raumplanung. Heft 3, Univ. Bremen.
- GRIGG, D. (1965): The logic of regional systems. In: Annals of the Assoc. of Amer. Geogr., 55
- HAASE, G. a i. (1991): Naturraumerkundung und Landnutzung. Beiträge zur Geographie, 34/1, Berlin: Akademie Verlag, s. 373. ISBN 3-05-500396-9
- HARČÁR, J. (1972): Šarišská vrchovina-fyzickogeografická analýza. In: Geografické práce, roč.3, č. 1–2. Bratislava: SPN, 272 s.
- HARČÁR, J. a i. (1982): Geografia okresu Prešov. In: Spravodaj XXI. Prešov: Vo SGS, s. 9-42.
- ISAČENKO, A. G. (1953): Osnovnyje voprosy fizičeskoj geografii. 1. vyd. Leningrad: Izdatel'stvo Leningradskogo Gosudarstvennogo Ordena Lenina Universiteta Imeni A. A. Ždanova, 392 s.
- ISAČENKO, A. G. (1967): Osnovnyje principy fiziko-geografičeskogo rajonirovanija. In: Geografický časopis, roč. 19, č. 4, s. 263-274.
- ISAČENKO, A. G. (1991): Landšaftovedenije i fiziko-geografičeskoe rajonirovanije, Moskva

- KANDOVÁ, E. (1973): Komplexný fyzicko-geografický profil Liptovskou kotlinou. In: Zborník PdF v Prešove UPJŠ v Košiciach. Prírodné vedy, roč. 8, č. 1, s. 173-189.
- KANDOVÁ, E., KARNIŠ, J., KOŠŤÁLIK, J. (1970): Fyzicko-geografické regióny Penín. In: Karniš, J. a i. Peniny – fyzicko-geografická charakteristika. Geografické práce, roč. 1, č. 2, Bratislava: SPN, s. 109-111.
- KANDRÁČOVÁ, V., MICHAELI, E. (1987): Priestorová štruktúra krajiny katastra Drienovskej Novej Vsi a jej poľnohospodárske využitie. In: Zborník PdF v Prešove UPJŠ v Košiciach. Prírodné vedy, roč. 22, č. 1, s. 167-203.
- KONDRACKI, J. (1976): Podstawy regionalizacji fizycznogeograficznej. 2. vyd. Varšava: Państwowe Wydawnictwo Naukowe, 168 s.
- KOLÉNY, M. (1997): Geosystémy v priestore Malacky–Modra–Pezinok–Senec. In: Geographia Slovaca 12. Szöllös, J. red. Bratislava: GÚ SAV, s. 61-68. ISSN 1210-3519
- KOŠŤÁLIK, J. (1980): Fyzickogeografická analýza okresu Stará Ľubovňa. Štátna výskumná úloha II- 5- 1/3. Dielčia záverečná správa. Prešov: KG PdF UPJŠ, 295 s.
- KOŠŤÁLIK, J. (1982): Krajina okresu Stará Ľubovňa. In: Geografia a životné prostredie. Drdoš, J. red. Prešov: SGS SAV, s. 49-61.
- KOŠŤÁLIK, J. (1984): Krajina okresu Stará Ľubovňa. 1. vyd. Bratislava: Príroda, 174 s.
- KOŠŤÁLIK, J. (1985): Fyzickogeografická regionalizácia – fyzickogeografické regióny. In: Košťálik, J. – Štecová, Ľ. – Novodomec, R. Metódy geografického výskumu. 1. vyd. Košice: UPJŠ, s. 190-192.
- KOŠŤÁLIK, J. (1985): Štruktúra krajiny okresu Stará Ľubovňa, jej delimitácia pre poľnohospodárstvo. Štátna výskumná úloha II–7–4/06. Dielčia záverečná správa za roky 1980-85. Prešov: KG PdF UPJŠ, 30 s.
- KROUPOVÁ, V. (1976): Komplexný fyzickogeografický profil a náčrt regionalizácie profilového územia v Malých Karpatoch. In: Acta Facultatis Rerum Naturalium Universitatis Comenianae, Geographico-physica 2. Plesník, P. red. Bratislava: SPN, s. 47-105.
- LAUKO, V. (1990): Objekt a predmet regionálnej geografie. In: Bašovský, O. – Lauko, V. Úvod do regionálnej geografie. 1. vyd. Bratislava: SPN, s. 36-41. ISBN 80-08-00278-6
- LEHOTSKÝ, M. (1991): Funkčné štruktúry krajiny (Štiavnické vrchy). 1. vyd. Bratislava: VEDA SAV, 152 s. ISBN 80-224-0114-5
- LUKNIŠ, M. (1977): Geografia krajiny Jura pri Bratislave. 1. vyd. Bratislava: UK, 212 s
- MAZÚR, E. (1971): Fyzicko-geografické členenie územia. In: Mazúr a i. 1971. Slovenský kras. Regionálna fyzickogeografická analýza. Geografické práce, roč.2, č. 1–2. Bratislava: SPN, s. 98-104.
- MAZÚR, E. a i. (1977): Geoekologické (prírodné krajinné) typy. 1:500 000. Bratislava: GÚ SAV
- MAZÚR, E. a i. (1979): Krajina vo východnej časti Zvolenskej kotliny a jej ochrana. In: Československá ochrana prírody 19, s. 37–58.
- MAZÚR, E. a i. (1980a): Geoekologické (prírodné krajinné) typy. 1:500 000. In: Atlas SSR. VIII. Fyzickogeografické-geoekologické krajinné jednotky. Bratislava: Veda SAV a SÚGK, s.98-99.
- MAZÚR, E. a i. (1980b): Geoekologické typy kotlinovej krajiny-Žilinská kotlina. 1:500 000. In: Atlas SSR. VIII. Fyzickogeografické-geoekologické krajinné jednotky. Bratislava: Veda SAV a SÚGK, s.104.

- MAZÚR, E. a i. (1980c): Geoeologické typy nížinnej krajiny-Záhorská nížina. 1:500 000. In: Atlas SSR. VIII. Fyzickogeografické-geoeologické krajinné jednotky. Bratislava: Veda SAV a SÚGK, 1980, s.101.
- MAZÚR, E. a i. (1980d): Geoeologické typy stredohorskej krajiny-Slovenský kras. 1:500000. In: Atlas SSR. VIII. Fyzickogeografické-geoeologické krajinné jednotky. Bratislava: Veda SAV a SÚGK, s.103.
- MAZÚR, E. a i. (1985): Krajinná syntéza oblasti Tatranskej Lomnice. 1. vyd. Bratislava: VEDA SAV, 106 s.
- MIČIAN, L. (1971): Náuka o geografickej sfére. Text k prvej časti osnov pre 3. ročník gymnázia. 1. vyd. Bratislava: Ministerstvo školstva SSR, 21 s.
- MIČIAN, L. (1984): Fyzickogeografická regionalizácia a jej význam pre prax. In: Přírodní vědy ve škole, roč. 36, č. 3, s. 107-111.
- MIČIAN, L. (1990): Základy náuky o fyzickogeografickej krajine. In: Mičian, L. – Zatkalík, F. Náuka o krajine a starostlivosť o životné prostredie. 2. vyd. Bratislava: PriF UK, s. 17-68. ISBN 80-223-0268-6
- MIČIAN, L., PLESNÍK, P. (1981): Fyzickogeografická regionalizácia Borskej nížiny (Západné Slovensko). In: Acta Facultatis Rerum Naturalium Universitatis Comenianae, Geographica, roč. 19, s. 249-267.
- MIČIAN, L., ZAŤKO, M. (1990): Geoeologické (fyzickogeografické, prírodné – krajinné) komplexy východnej časti Horehronia a náčrt ich niektorých potenciálov. In: Acta Facultatis Rerum Naturalium Universitatis Comenianae, Geographica, roč. 28, s. 3 – 24.
- MIDRIAK, R. (1997a): Geoecological (natural landscape) types of the upper part of the Zboj Creek catchment area. In: Midriak, R. a i. 1997. The landscape diversity and its protection in the eastern part of the East Carpathians Biosphere Reserve. (Case study from the catchment area of the Zboj Creek). Vedecké štúdie 11. Zvolen: TU, s. 14-16. ISBN 80-228-0692-7
- MIDRIAK, R. (1997b): Typy reliéfu a prírodnej krajiny v biosférickej rezervácii Východné Karpaty. In: Acta Facultatis Ecologiae 4. Zvolen: TU, s. 43–53.
- MICHAELI, E. (1976): Fyzickogeografická regionalizácia východnej časti Hornádskej kotliny, juhovýchodnej časti Levočských vrchov a západných strání Braniska. Kandidátska dizertačná práca. Bratislava: PriF UK, 214 s.
- MICHAELI, E. (1980): Fyzickogeografická regionalizácia Hornádskej kotliny. Štátna výskumná úloha II- 5- 1/3. Čiastková správa. Prešov: KG PdF UPJŠ, 142 s.
- MICHAELI, E. (1983): Priestorová diferenciacia Podhradskej kotliny. In: Zborník PdF v Prešove UPJŠ v Košiciach. Prírodné vedy, roč. 20, č. 1, s. 261-280.
- MICHAELI, E. (1985): Štruktúra krajiny Hornádskej kotliny a jej hospodárske využitie. Štátna výskumná úloha II – 7 – 4/06. Čiastková správa. Prešov: KG PdF UPJŠ, 22 s.
- MICHAELI, E., KANDRÁČOVÁ, V. (1982): Príspevok ku geografii obce Medzany. In: Geografia a životné prostredie. Drdoš, J. red. Prešov: SGS SAV, s. 94-102.
- MICHAELI, E., KANDRÁČOVÁ, V. (1985): Racionálne využívanie potenciálu krajiny na príklade Šarišských Michalian. In: Geografický časopis, roč. 37, č. 4, s. 394 - 412.
- Michajlov, N. I. (1985): Fiziko-geografickosje rajonirovanie. Moskva
- MICHAL, P. (1976): Komplexný fyzickogeografický profil časťou Nízkyh Tatier, Zvolenskej kotliny a Kremnických vrchov. In: Acta Facultatis Paedagogicae Banská

- Bystrica, Sériá prírodovedná, Geografia II. Mazúrek, J. red. Bratislava: SPN, s. 119-148.
- MICHAL, P. (1997): Základy komplexnej fyzickej geografie. 1. vyd. Banská Bystrica: FPV UMB, 90 s. ISBN 80-8055-042-5
- MIKLÓS, L. (1978): Náčrt biologického plánu krajiny v povodí Gemerských Turcov. In: Quaestiones geobiologicae 21 (Problémy biológie krajiny 21). Bratislava: VEDA SAV, s. 5–127.
- MIKLÓS, L. (1983): Formalizované hodnotenie krajiny pre rekreačné činnosti. In: Sborník Československé geografické spoločnosti, roč. 88, č. 1, s. 13-32. ISSN 0231-5300
- MINÁR, J. (1998): Georeliéf a geoekologické mapovanie vo veľkých mierkach. Habilitačná práca. Bratislava: PriF UK, 165 s.
- MINÁR, J. a i. (2001): Geoekologický (komplexný fyzickogeografický) výskum a mapovanie vo veľkých mierkach. Geografické spektrum 3. Bratislava: Geografika, 212s. ISBN 80-968146-3-X
- OŤAHEL, J. (1978): Fyzickogeografická regionalizácia Liptovskej kotliny. In: Quaestiones geobiologicae 20 (Problémy biológie krajiny 20). Bratislava: VEDA SAV, s. 7–84.
- OŤAHEL, J. (1982): Krajinný potenciál Liptovskej kotliny a návrh jeho využitia. In: Geografia a životné prostredie. Drdoš, J. red. Prešov: SGS SAV, s. 62-72.
- OŤAHEL, J. (2000): Prírodná (rekonštruovaná) krajina – geoekologická štruktúra. In: Oťahel, J. a i. Prírodná (rekonštruovaná) a súčasná krajinná štruktúra Slovenska hodnotená využitím bázy údajov CORINE LAND COVER. Geographia Slovaca 16. Bratislava: SAV GÚ, 74 s. ISSN 1210-3519
- OŤAHEL, J., POLÁČIK, Š. (1987): Krajinná syntéza Liptovskej kotliny. 1. vyd. Bratislava: Veda, 120 s.
- OŤAHEL, J., FERANEC, J. (1997): Rural landscape assessment in environmental planning: Case study-part of the Záhorie Lowland. In: Rural geography and environment. Brno: Inštitút Geoniky Akadémie vied Českej republiky, s. 89-96.
- OŤAHEL, J., FERANEC, J. (1998): Landscape structure analysis in environmental planning: case study- Part of Liptov (Slovakia). In: Nature and culture in Landscape Ecology. Kovář, R. red. Praha: Univerzita Karlova, s. 155-169. ISBN 80-7184-956-1
- OŤAHEL, J., ŽIGRAJ, F., DRGOŇA, V. (1993): Landscape use as a basis for environmental planning (case studies of Bratislava and Nitra hinterlands). In: Geographical studies 2: Environmental problems in Central Europe: experiences from Slovakia and Austria. Drgoňa, V. red. Nitra: University of Education Nitra, College of Natural Sciences, Department of Geography, s. 7-83. ISBN 80-88738-01-6
- OŤAHEL, J., LEHOTSKÝ, M., IRA, V. (1997): Environmental Planning: Proposal of Procedures (Case Studies). In: Ekológia, roč. 16, č. 4, s. 403-420.
- PETROV, P. V. (1991): Landšaftná regionalizácia – obektivná osnova vijasnenija ekologičeskoj situacii regionov. In: Acta Facultatis Rerum Naturalium Universitatis Comenianae. Geographica, roč. 31, s. 195-199. ISBN 80-08-01572-1
- RODOMAN, B. B. (1965): Logičeskije i kartografičeskije formy rajonirovanija i zadači ich izučeniija. In: Izvestija AN SSSR, serija geogr. 4, Moskva.
- RUŽIČKA, M., DRDOŠ, J., RUŽIČKOVÁ, H. (1974): Zásady biologického plánu krajiny ako podklad pre plánovanie sídlisťných celkov na modelovom území Bratislava – Lamač. In: Quaestiones geobiologicae 15 (Problémy biológie krajiny 15). Bratislava: VEDA SAV, s. 3 – 38.

- SPENCE, N. A., TAYLOR, P. J. (1970): Quantitative methods in regional taxonomy. In: Board, C., Chorley, R. J., Haggett, P., Stoddart, D. R. (eds.), Progress in Geography, 2. London : Arnold, s. 1-64.
- ŠELIGA, L. (1978): Complex physical – geographical profile and the structure of the landscape of the central part of the Záhorská lowland. In: Acta Facultatis Rerum Naturalium Universitatis Comenianae, Geographica, roč. 16, s. 149–176.
- TREMBOS, P., MINÁR, J. (1997): Geoekologické podklady o území a trvalo udržateľný rozvoj. In: Acta environmentalica Universitatis Comenianae. Bratislava: UK, s. 129-136.

TEORETICKO-METODICKÉ ZÁKLADY FYZICKOGEOGRAFICKEJ REGIONALIZÁCIE A JEJ REFLEXIA VO VYBRANÝCH REGIONÁLNYCH PRÁČACH SLOVENSKÝCH GEOGRAFOV

Zhrnutie

Vo fyzickej geografii je podstatný a typický priestorový aspekt štúdia sledovaných javov, t. j. skúmajú sa javy (vrátane krajiny) s ich obsahom a priestorovým aspektom, pričom dôležitým znakom je priestorová diferenciácia javov a fyzickogeografickej krajiny a zákonitosti tejto diferenciácie. Zákonitosti priestorovej diferenciácie sú podľa Otáheľ'a (1978) najdôležitejším teoretickým základom fyzickogeografickej regionalizácie. Výrazom objektívnych zákonitostí priestorovej diferenciácie je systém jednotiek fyzickogeografickej regionalizácie. Tento systém je v rôznej miere poznačený subjektívnym prístupom autora (voľba kritérií, vedenie hraníc). Fyzickogeografickou regionalizáciou sa označuje proces poznávania špecifických vlastností systému fyzickogeografickej sféry, konkrétne jej kontinuity a zároveň diskretnosti. Existencia procesu fyzickogeografickej regionalizácie plynie z objektívnej existencie fyzickogeografických komplexov (regiónov), t.j. častí fyzickogeografickej sféry vzájomne ohraničených a odlišujúcich sa nielen kvantitatívne, ale i kvalitatívne.

Problematika fyzickogeografickej regionalizácie intenzívne rezonovala v európskej geografii predovšetkým v 50. a 60. rokoch. Hlavnými centrami rozvoja výskumu v tejto oblasti bolo Rusko, bývalá NDR, neskôr aj Poľsko a Slovensko. Formulovanie teoreticko-metodických základov fyzickogeografickej regionalizácie bolo záležitosťou predovšetkým ruskej geografickej školy. Z viacerých prác sem patria diela Armada (1964), Fediny (1973), Isačenko (1953, 1967, 1991), Petrova (1991), Michajlova (1985), Beručašviliho-Žučkovej (1997), Rodomana (1965) a ďalších. Z nemecky píšucich autorov možno spomenúť Haaseho (1991), Fischera (1982), z poľskej geografickej školy zase Kondrackého (1976). Z anglo-americkéj literatúry je to napríklad Grigg (1965) a Spence-Taylor (1970). Na Slovensku sa podrobnejšie touto problematikou zaoberal Mičian (1971, 1984, 1990), Drdoš et al. (1981), Košťálik (1985), Michal (1997), Lauko (1990), Bezák (1993), Minár et al. (2001) a ďalší.

Napriek tomu, že v súčasnom období už otázka fyzickogeografickej regionalizácie nie je v popredí záujmu slovenských fyzických geografov, táto problematika má svoje nezastupiteľné miesto v slovenskej geografickej škole. Viacero významných slovenských

geografov začínalo práve na báze fyzickogeografickej regionalizácie a aj v súčasnosti sa ňou končia viaceré regionálne fyzickogeografické práce.

Podľa *Mičiana (1984)* definícia fyzickogeografickej regionalizácie je v podstate zhodná so všeobecnou definíciou regionalizácie, iba je zúžená na fyzickogeografickú sféru, resp. výber regionalizačných kritérií je obmedzený na komponenty fyzickogeografickej sféry. Na základe toho tvrdí, že fyzickogeografická regionalizácia ako proces je vyhraničovanie prírodno-teritoriálnych (akvatoriálnych) jednotiek (t.j. výrezov fyzickogeografickej sféry) majúcich nejaký spoločný znak vybraný len z komponentov fyzickogeografickej sféry) a ich oddelenie od teritórií (akvatórií), ktoré tento znak nemajú.

Problematika fyzickogeografickej regionalizácie je v teoreticko-metodickej i praktickej forme v slovenskej geografii rozpracovaná v početných prácach rôznych autorov. Regionálnych prác, ktoré sa zaoberajú fyzickogeografickou regionalizáciou na konkrétnom území bolo publikovaných viacero. Pre potreby príspevku sme urobili výber podľa jednotlivých autorov. V analýzach prác sme sa zamerali hlavne na použité kritériá vyčleňovania fyzickogeografických typov, resp. regiónov, počet taxonomických úrovní a územné celky, ktoré boli predmetom regionalizácie.

Na základe uvedených prác je zrejmé, že veľmi často regionalizovaným územím je kataster obce a jeho zázemie, profilový pás prechádzajúci viacerými geomorfologickými celkami, kombinácia kontrastných území (pohorie-kotlina, pohorie-nížina) či jednoducho celý geomorfologický celok, alebo jeho časť. Najčastejším diferenciálnym faktorom, ktorý sa v procese fyzickogeografickej regionalizácie najviac uplatňuje a podľa ktorého sa potom spravidla vedú hranice jednotlivých fyzickogeografických jednotiek je georeliéf, v menšej miere sa uplatňujú iné faktory. Z hľadiska počtu taxonomických úrovní sa najviac využíva viacstupňová (mnohostupňová) regionalizácia.

Fyzickogeografická regionalizácia predstavuje spravidla zavŕšenie etapy podrobnej fyzickogeografickej analýzy vybraného územia, jeho všetkých čiastkových zložiek. Bola a stále ešte je často používanou metódou k získaniu komplexného syntetického pohľadu na skúmané územie. Poskytuje nám prehľad o území z hľadiska jeho heterogenity, či väzieb medzi čiastkovými jednotkami. Predložená stručná analýza vybraných regionálnych prác slovenských geografov poukazuje na jej významnú úlohu pri fyzickogeografickom výskume krajiny.

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

LANDSCAPE IN ENVIRONMENTAL ASSESSMENT

Ján DRDOŠ¹

Abstract: *For reintegration process, which is characteristic for our century within international geography, projects aiming at phenomenon society-environment in common solution of both physical and human geography are of great importance. An example of such projects, up to now mostly limited to physical geography, are environmental projects. They concern analyses and valuations of the state of human environment (as a certain case can serve a common projects of physical and human geography - Drdoš, Székely, 1994, or environmental assessments according to the Act on environmental impact assessment, at which our geography participate importantly). A particular position in environmental assessment is covered by landscape (with its various properties and structures), which is in Slovak geography understood anthropocentrically, then from the point of view of human interests, what was characteristic for the programmes of Landscape Synthesis (see Drdoš et al., 1980) and Landscape Potential (see Mazúr, Drdoš, 1984).*

Key words: *geography, landscape, landscape structure, landscape properties, society-environment, environmental assessment*

INTRODUCTION

It seems, that a dissatisfaction with the state and tendency in geography appears in this science in half century cycles. The landscape concept was discussed in the midst of the 20th century, and the result of discussion was, that this concept was refused and replaced by specialization concept. The consequence was the fragmentation of geographical study object. In spite of that, geography was declared to be a science of humans (society) and environment, which was determined by the fact, that geographers study the society and human activities (human geography) on one hand, and the physical environment (physical geography) on the other.

Since the beginning of the 21st century geographers are being searched for ways to reintegrate both the two basic branches of their science (see Wardenga, Weichhart, 2006; in our country Matlovič, 2006, Hofierka, 2006). The solution is offered by the social ecology dealing with the society-nature interactions (Fischer-Kowalski, Erb, 2006). The model of social ecology is very suitable for geography, defined by Blotevogel (2002) as a „science about the Earth's surface in its spatial differentiation, physical equipment, and as a space and place of human life and actions“ (in: Fischer-Kowalski, Erb, 2006; a series of similar definitions see Drdoš, 2004). The approach of social ecology allows to overcome splitting of geography (Wardenga, Weichhart, 2006).

The system society-nature (natural environment/landscape) is anthropocentric (similarly like the concept of sustainability). It means that the priority is looking upon the natural environment, or landscape from the viewpoint of human interests (not only economic ones), and in foreground are those aspects of natural environment/landscape, which are important for human life and human space.

1 **Prof. RNDr. Ján Drdoš, DrSc.,**
Púpavová 26, 841 04 Bratislava 4, e-mail: Jan-D@pobox.sk

Authors (e. g. Egner, 2006) warn, that the reintegration process in geography should not be violent, as it could damage the diversity and creativity of geography. It should refer first of all to joint projects. In Slovakia such attempt was presented by Drdoš, Székely (1994).

In this context a question could be put, whether the issue of landscape could be involved into the reintegrated study of geography. The answer can be positive, since landscape is a spatial phenomenon (according to Fischer-Kowalski, Berg, 2006 geography as a spatial science has a big advantage in the study of the system society-nature and surpasses the social ecology, which has not any spatial dimension; its second advantage is, that geography studies both society and natural environment).

In Slovakia, from the applied viewpoint, the notion of landscape for the solution the environmental problems was elaborated already in the early 80-ies of the 20th century in the programmes Landscape Synthesis, Landscape Potential, also Landscape Planning (see Drdoš, 1978, 1983, Oľahel', 1980, Mazúr, Drdoš, 1984), and after 1990 in Environmental Impact Assessment (see Kozová et al., 1995).

The main task of landscape study for purposes of environmental assessment (in context with the system society-nature) is research of landscape components, population and its activities (analysis), of landscape structures (synthesis), of landscape properties and anthropic alterations, impacts on landscape, population and its activities (assessment), and elaboration of proposals for mitigation of impacts, and for recovery (management).

THE NOTION OF LANDSCAPE IN ENVIRONMENTAL ASSESSMENT

According to different approaches to the notion of landscape (e. g. Krcho, 1974, Mazúr et al., 1980, Oľahel', 1994, Miklós, Izakovičová, 1997, Žigrai, 1998, and other authors – see Drdoš, 2004), this notion can be defined as a spatial dynamic system of material, mutually joint elements, which is linked to the Earth's surface, is differentiated in space and time, has its own visual quality, and is a space of human life. Humans are through their metabolism a part of landscape, and they have to it not only a beneficial relation, but also a spiritual one, since the landscape is their home.

Singular constituents of this definition are objects of different definitions, e. g. of Krcho (1974): "The geographic sphere is interpreted as a spatial cybernetic system composed of two autonomous subsystems – anthroposphere and physico-geographical sphere. Result of their interaction is the present landscape as the basis of the environment for humans"; Mazúr, Urbánek, Drdoš (1980): "Landscape is a dynamic spatial system consisting of phenomena of natural and socio-economic character which is linked to Earth surface"; Miklós, Izakovičová (1997): "Landscape is considered a holistic entity of real world, total system of geographical sphere, hence a geosystem in a broad sense of the word"; Žigrai (1997): "Cultural landscape represents material and spiritual result of the relationship between the human and the environment"; The draft of the Act of the National Council SR about landscape planning (2006) defines the landscape as follows: "Landscape is an arrangement of original, transformed and new-created landscape elements, components, and landscape complexes in landscape system; landscape structure and its elements appears like limits, restricting, or supporting factors required human activities in a certain type of landscape".

Comprehensively is the landscape interpreted by Ot'ahel' (1994): "Landscape is a system of material elements, which interact in synergy through their properties in spatial and temporal dimensions. Its material structure possesses its outer manifestation, image of which is differentiated in time and space by its visual structure".

In the concept of environmentalistics (in terms of Klinda, 1999) involving also the environmental planning (see e. g. Drdoš, 2004, Drdoš et al., 2005), which is based on the concept of sustainability, the notion of landscape should follow from these concepts. As the landmark of the sustainability is anthropocentrism (Timašev, 2006: sociocentrism), the landscape should be interpreted from this point of view (see Drdoš, 1983), and as an element of the system man (society) – environment (sensu social ecology). According to Mazúr et al. (1980) dealing with landscape is reasonable from the sight of human interests only, and the point of view of social needs gives to the landscape study its own sense. The aim of landscape study is to recognize the landscape as a human home, as an object of his work, and also as his existential basis.

The relation of humans to the landscape as their home and the basis of their existence is of primary importance in the environmental assessment. This approach corresponds to the concept of sustainability, and also to the new study of two equivalent elements within the system society – environment. This approach requires therefore the study of the human society and its activities.

Isačenko (2006) writes, that „man is an indivisible part of nature, but also in contrast to it as a thinking being and subject of economic activity...It is necessary to aim to concrete forms and mechanisms of effects both of man and landscape as two equivalent systems in landscape study“.

In environmental projects we have to distinguish between the notion of landscape as an objective reality (our idea about the landscape as a holistic entity), and the notion of landscape as a research topic (a part of the reality delineated by selected criteria). The real landscape research, mainly in context with environmental assessment should follow from the definition of geography as a science on society and its physical environment, which are connected by their mutual interrelations, and by their joint space. The physical environment is a home and source of satisfaction of human needs, and the society as an agent, which changes and transforms the physical environment (see e. g. Timašev, 2006).

DESCRIPTION OF LANDSCAPE IN ENVIRONMENTAL ASSESSMENT

In environmental assessment the description of landscape contains all its aspects – landscape as a system (geosystem – a system model of landscape), landscape as a visual entity (percept) and landscape as a home of humans (identity). Simultaneously the landscape should be described in context with sociocentric system: physical environment (physical, or physico-geographical landscape) – human population (selected demogeographical data, health and quality of life of people) - culture (activities and material products of human work).

The purpose of landscape description in environmental assessment is to present the comprehensive characteristics of landscape, which is a starting-point for assessment of alterations in landscape, and at the same time a basis for comparison of starting-point with a new situation, created by realization of mitigation measures. This purpose requires a description of landscape as a geosystem, as a percept and identity. The basic criterion is the sustainability.

Description is the result of analysis (geoscientific, biological, ecological, social, environmental) of physical (natural, physico-geographical), and anthropogenic (human-geographical) components of landscape and connecting processes. Processes are analysed with regard to formation of landscape structures (see Chorošev, Aleščenko, 2007), and also to their significance for the living space of humans (Egner, 2006). Natural and anthropogenic processes are also interpreted as hazards and risks (see Drdoš, 1992).

Another component of landscape description is that of its structures. Landscape is polystructural. The polystructurality, according to Chorošev, Aleščenko (2007) is given by fact, that on each hierarchical level of landscape an individual structure done by a different leading factor of forming interrelations among landscape components, is being formed. Landscape is polystructural also from other points of view. Besides topological (vertical) and chorological (horizontal, or spatial) structures, also structures according to the degree of anthropogenic alterations can be distinguished : physical (natural) and anthropogenic (given by land-use) ones. An individual kind of landscape structure is the ecological network (biocentres, biocorridors, biosegments, and other parameters significant from the point of view of biodiversity and exchange of information), further visual structure (given by perception), in landscape planning very important tertiary landscape structure (given by different legal norms, mainly on nature and landscape protection), and the structure of stressors (sources of adverse impacts on ecosystems and geosystems) – in detail see e. g. Oľahel' (1994), Drdoš (1995, 2004), Miklós, Izakovičová (1997), Izakovičová (2001), Čech (2004), Michaeli (2004), Ružička, Mišovičová (2006) and others.

The further equivalent part is description of perceived landscape, landscape scenery and identity (in detail see Oľahel', 1994, 1996, 1999, Drdoš, 1995, 1998, 2004, Štefunková, 1998). The description of perceived landscape is interdisciplinary (geosciences, ecology, humanities); that of landscape identity is a product of sociology. The landscape identity is done by the emotional relation of humans to their environment, to landscape, where they live and work, and held it for their home. They have interest in its quality and are afraid of its alterations (in its topological, chorological and visual structures).

The description of the environmental quality of landscape (disturbancies, pollution) is the result of environmental analyses.

Since the landscape is interpreted as a living space and environment of humans and of all organisms, the equivalent stress is being put on the conditions of human existence and of organisms (according to the Act on nature and landscape protection).

An important part of landscape description is the information about the carrying capacity of landscape (see Drdoš, 1990, Drdoš, Kozová, 1992, Drdoš, Hrnčiarová, 2005, Hrnčiarová et al., 1997). This information is gained with help of analysis of sensitivity (and geoecological significance) of singular landscape components and of factors of quality of human life. From comparison of carrying capacity with the spatial distribution and intensity of environmental problems (disturbancies and pollution of physical components and structures) the spatial synthesis of landscape charge follows. In order to avoid the destruction of landscape structures, it is necessary to determine the critical threshold value of the anthropogenic load. It is done by limits. Drdoš, Hrnčiarová (2005) distinguish spatial, geocomponental, geodynamic, ecological, ecosozological, cultural-historical, hygienical and safety limits.

The landscape description should involve also the description of landscape potential as a complete asset of landscape to fulfil functions for man (see e. g. Mazúr, Drdoš, 1984, Drdoš, 2006, Oťahel', Poláčik, 1987, Ivanová, Valek, 2005, Valek, Ivanová, 2006 and others).

This complete approach to analysis and synthesis reflects the holistic interpretation of landscape, which is inevitable for decision-making about land-use. The aim is to get the comprehensive information about all aspects of landscape - as geosystem, its properties, structures, utilization, as a living space of humans and all gene-pool, its values and also measure of disturbances.

Information about landscape (as one element of the system society-environment) must be completed by the description of population and its activities in affected locality (analysis of human geography). Information about all aspects of human life, which would be affected by planned human activity, or strategical documentation (see the Act Nr. 24/2006 Coll. on Environmental Impact Assessment) are especially important.

CONCLUSION

The research and assessment of landscape in relation to human environment has a long-term tradition in Slovak geography. It is connected with the fact, that the applied geography was already in the past well developed, so that it allowed to develop integrative landscape approach. Landscape was since the beginnings of its study interpreted as holistic entity (see Drdoš, Oťahel', 2006), what was projected also into the landscape ecology, and after 1990 also into environmental programmes, inclusively environmental impact assessment (see Kozová et al., 1995).

References

- BLOTEVOGEL, H.H. (2002): Geographie. In: Brunotte, E. et al.: Lexikon der Geographie. In vier Bänden. Heidelberg (Spektrum), 14-16.
- ČECH, V. (2004): Fyzicko-geografická analýza a regionalizácia krajiny centrálnej časti pohoria Galmus a priľahlej časti Hornádskej kotliny. Dizertačná práca. Prešov (FHPV PU).
- DRDOŠ, J. (1978): Geografia a jej úlohy pri ochrane a tvorbe životného prostredia. Geografický časopis, 30, 218-226.
- DRDOŠ, J. (1983): Landscape Research and Its Anthropocentric Orientation. GeoJournal, 7, 2, 155-160.
- DRDOŠ, J. (1990): Príspevok k problematike únosnosti krajiny na príklade Tatranského národného parku. Geografický časopis, 42, 3-22.
- DRDOŠ, J. (1992): On the Carrying Capacity of Environment. Geografía y Desarrollo, 3, 7, 19-24.
- DRDOŠ, J. (1995): Krajinný obraz a jeho hodnotenie. Životné prostredie, 29, 4, 202-205.
- DRDOŠ, J. (1998): Krajinný obraz – pojem, metódy hodnotenia. In: Gál, P., ed.: Krajinný obraz - národná kultúrna hodnota. Bratislava (FA STU), 11-28.
- DRDOŠ, J. (2004): Geoekológia a environmentalistika. Krajinná ekológia/geoekológia, jej environmentálne poslanie a úlohy. Prešov (FHPV PU).

- DRDOŠ, J. (2005): Posudzovanie vplyvov na životné prostredie. In: Drdoš, J., Michaeli, E. (ed.): Geokológia a environmentalistika. II. Časť. Environmentálne plánovanie v regionálnom rozvoji. Prešov (FHPV PU), 91-104.
- DRDOŠ, J. (2006): Krajinný potenciál – integračná téma geografie? *Folia geographica*, 45, 10, 112-122.
- DRDOŠ, J., MAZÚR, E., URBÁNEK, J. (1980): Landscape Syntheses and Their Role in Solving the Problems of Environment. *Geografický časopis*, 32, 119-129.
- DRDOŠ, J., KOZOVÁ, M. (1992): Súčasný stav výskumu únosnosti územia (Carrying Capacity). *Geografický časopis*, 44, 356-362.
- DRDOŠ, J., SZÉKELY, L. (1994): Environmental Quality and Environmental Promotion (Upper Nitra Region). *GeoJournal* 32, 3, 225-229.
- DRDOŠ, J., HRNČIAROVÁ, T. (2005): Únosnosť – metodika na stanovenie limitov využívania krajiny. *Folia geographica*, 43, 8, 219-232.
- DRDOŠ, J., MICHAELI, E., HRNČIAROVÁ, T. (2005): Geokológia a environmentalistika. Environmentálne plánovanie v regionálnom rozvoji. Prešov (FHPV PU).
- DRDOŠ, J., OŤAHEL, J. (2006): Integračné aspekty výskumu krajiny na Slovensku (vývoj a súčasné trendy). *Geografická revue*, 2, 2, 181-211.
- EGNER, H. (2006): Autopiesis, Form und Beobachtung - moderne Systemtheorie und ihr möglicher Beitrag für eine Integration Human- und Physiogeographie. *Mitteilungen der Österreichischen Geographischen Gesellschaft*, 148, 92-108.
- FISCHER-KOWALSKI, M., ERB, K. (2006): Epistemologische und konzeptuelle Grundlagen der Sozialen Ökologie. *Mitteilungen der Österreichischen Geographischen Gesellschaft*, 148, 33-56.
- HOFIERKA, J. (2006): Problémy súčasnej slovenskej geografie a možnosti riešenia. *Folia geographica*, 44, 9, 86-91.
- HRNČIAROVÁ, T. et al. (1997): Ekologická únosnosť krajiny I. časť – metodický postup. In: Hrnčiarová, T. et al.: Ekologická únosnosť krajiny – metodika a aplikácia na 3 benefičné územia, I-IV. Ekologický projekt MŽP SR, Bratislava (ÚKE SAV).
- CHOROŠEV, A. V., ALEŠČENKO, G.M. (2007): Charakternoje prostranstvo mežkomponentnych otnošenij v landšafte. *Vestnik Moskovskogo universiteta, serija 5, geografiya*, 1, 22-28.
- ISAČENKO, A. G. (2006): Landšaftovedenije na perechode ko vtoromu stoletiju svojej istorii. In: Djakonov, K.N. et al., ed.: Landšaftovedenije: teorija, metody, regional'nyje issledovanija, praktika, 3-8. Moskva (Geografičeskij fakul'tet MGU). 787 str.
- IVANOVÁ, M., VALEK, E. (2005): Hodnotenie prírodného potenciálu vybranej lokality Pienin pre letný cestovný ruch a rekreáciu a jeho dopad na životné prostredie. Referát na konferencii „Globalizace a její vliv na společnost, regiony a státy“. 11-12. 10. 2005, Ostrava.
- IZAKOVIČOVÁ, Z. (2001): Stresové faktory krajiny. In: Drdoš, J., Michaeli, E., ed.: Geokológia a environmentalistika. II. Časť. Environmentálne plánovanie. Prešov (FHPV PU), 128-146.
- KLINDA, J. (1999): Environmentalistika a jej miesto v spoločnosti. *Enviromagazín*, 4, 13.
- KOZOVÁ, M., DRDOŠ, J., PAVLIČKOVÁ, K., ÚRADNÍČEK, Š., HUSKOVÁ, V. et al. (1995): Posudzovanie vplyvov na životné prostredie. II. Diel. Komentár ku krokom posudzovania vplyvov činností s príkladmi odporúčaných postupov a metód. Bratislava (ŠEVT).

- KRCHO, J. (1974): Štruktúra a priestorová diferenciácia fyzicko-geografickej sféry ako kybernetického systému. *Geografický časopis*, 26, 133-162.
- MATLOVIČ, R. (2006): Geografia – hľadanie tmelu. *Folia geographica*, 44, 9, 6-43.
- MAZÚR, E., DRDOŠ, J., URBÁNEK, J. (1980): Geography and the Changing World. *Geografický časopis*, 34, 3, 97-107.
- MAZÚR, E., DRDOŠ, J. (1984): Conception of Resources or Conception of Landscape Potential in the Geographical Research? *Geografický časopis*, 36, 305-315.
- MICHAELI, E. (2004): Metodologické poznámky k výskumu fyzicko-geografickej štruktúry krajiny a jej transformácie na príklade Hornádskej kotliny a priľahlých pohorí. *Folia geographica*, 42, 7, 167-190.
- MIKLÓS, L., IZAKOVIČOVÁ, Z. (1997): Krajina ako geosystém. Bratislava (Veda).
- OŤAHEL, J. (1980): Štúdium percepcie krajinskej scenérie a jeho prínos k lokalizácii zariadení cestovného ruchu. *Geografický časopis*, 32, 250-261.
- OŤAHEL, J. (1994): Visual Landscape Perception Research for the Environmental Planning. *Geographia slovacica*, 6, 97-103.
- OŤAHEL, J. (1996): Krajina: pojem a vnem. *Geografický časopis*, 48, 241-253.
- OŤAHEL, J. (1999): Visual Landscape Perception: Landscape Pattern and Aesthetic Assessment. *Ekológia (Bratislava)* 18, 63-74.
- OŤAHEL, J., POLÁČIK, Š. (1987): Krajinná syntéza Liptovskej kotliny. Bratislava (Veda).
- RUŽIČKA, M., MIŠOVIČOVÁ, (2006): Krajinná ekológia. Nitra (Združenie Biosféra a KEE FPV UKF).
- ŠTEFUNKOVÁ, D. (1998): Hodnotenie vizuálnej kvality krajiny - príklad krajinné-ekologického postupu. In: Moncol, M., ed.: Krajinný obraz – národná kultúrna hodnota. Bratislava (STU), 95-102.
- TIMAŠEV, I.E. (2006): Geoeekologija: ekologo-landšaftnaja paradigma. . In: Djakonov, K.N. et al., ed.: Landšaftovedenije: teorija, metody, regionalnyje issledovanija, praktika, 462-465. Moskva (Geografičeskij fakul'tet MGU). 787 str.
- VALEK, E., IVANOVÁ, M. (2006): Evaluation of the Natural Potential of Selected Locations for the Summer Tourist Industry an Recreation and Its Impact on the Environment. In: Siwek, T., Baar, V: Globalisation and Its Impact to Society, Regions, States, Ostrava (OU Service), 297-301.
- WARDENGA, U., WEICHHART, P. (2006): Sozialökologische Interaktionsmodelle und Systemtheorien – Ansätze einer theoretischen Begründung integrativer Projekte in der Geographie? *Mitteilungen der Österreichischen Geographischen Gesellschaft*, 148, 9-31.
- ŽIGRAI, F. (1998): Land Use as a Connection between Culture and the Environment (Some Theoretical and Methodological Notes). *Proceedings from the 3rd International Conference on Culture and Environment*, 23th-25th November, 1997, Banská Štiavnica.

KRAJINA V ENVIRONMENTÁLNOHODNOTENÍ*Zhrnutie*

Zdá sa, že v medzinárodnej geografii sa v polstoročných cykloch prejavuje nespokojnosť so stavom, zameraním a smerovaním tejto vedy. V polovici 20. stor. prebiehala diskusia o holistickej krajinnej koncepcii, ktorá skončila jej odmietnutím a vystriedala ju koncepcia špecializácie, ktorá doviedla geografiu k jej rozštiepeniu a fragmentarizácii jej predmetu (pozri Wardenga, Weichhart, 2006).

Na prelome tisícročí sa opäť prejavila nespokojnosť, teraz však s fragmentarizovanou geografiou a hľadajú sa cesty k reintegrácii dvoch základných geografických odvetví (pozri Matlovič, 2006, Hofierka, 2006). Východisko podľa Wardengu, Weichharta (2006) ponúka sociálna ekológia, ktorá jav spoločnosť-prostredie chápe ako dynamický systém (pozri Fischer-Kowalski, Erb, 2006).

Systém spoločnosť-prostredie je antropocentrický (podobne ako koncepcia trvalej udržateľnosti), to znamená, že k prírode (a krajine) sa pristupuje z hľadiska záujmov človeka (avšak nielen ekonomických) a v popredí sú tie aspekty prírody a krajiny, ktoré ovplyvňujú jeho život a jeho životný priestor. Timašev (2006) hovorí o sociocentrizme, a to z dôvodov, že ľudská spoločnosť je dnes v štádiu rozvoja keď radikálne mení prírodu Zeme. Preto v kontexte Zeme je osobitným geografickým komponentom.

Diskutéri (napr. Egner, 2006) upozorňujú, že reintegračný proces by nemal byť násilný, lebo by mohlo dôjsť ku škodám na rozmanitosti a kreativite geografie. Mal by sa odohrávať predovšetkým v polohe spoločných projektov, dovoľujúcich účasť obidvoch odvetví (avšak nie v položení dvoch výsledkov za sebou, ale v spoločnom rozpracovávaní problémov javu spoločnosť-prostredie). V slovenskej geografii pokus o takýto prístup prezentovali Drdoš, Székely (1994).

V súvislosti s touto diskusiou si možno položiť otázku, či je možné do integračných výskumov začleniť problém krajiny. Na túto otázku možno odpovedať kladne, keďže krajina je priestorovým javom (Fischer-Kowalski, Erb, 2006 považuje to, že geografia je priestorovou vedou za jej veľkú výhodu pri výskume javu spoločnosť-prostredie, čím predčí sociálnu ekológiu, ktorej chýba priestorový rozmer) a zároveň vstupuje do prvků príroda i kultúra.

Na Slovensku sa z aplikačného pohľadu, pre účely riešenia problémov človek-životné prostredie rozpracoval antropocentrický pojem krajiny už v 80. r. 20. stor., a to v medzinárodnom programe „Krajinná syntéza“ (pozri Drdoš et al., 1980), v téme krajinného potenciálu (pozri Mazúr, Drdoš, 1984), v téme krajinného plánovania (pozri Drdoš, 1978) a krajiny ako vizuálneho javu (pozri Otáhel, 1980).

Pre pojem krajiny v environmentálnom hodnotení sú zvlášť významné jeho definície v legislatíve. Krajina je u nás definovaná v zákone NR SR č. 237/2000 Z. z. o územnom plánovaní a stavebnom poriadku (zahrňujúcom krajinné plánovanie). Tento zákon definuje krajinu ako „komplexný systém priestoru, polohy, georeliéfu a ostatných vzájomne funkčne prepojených hmotných prirodzených a človekom pretvorených aj vytvorených prvků, najmä geologického podkladu a pôdotvorného substrátu, vodstva, pôdy, rastlinstva a živočíšstva, umelých objektů a prvků využitého územia, ako aj ich väzieb vyplývajúcich zo sociálno-ekonomických javů v krajine. Krajina je životným prostredím človeka a ostatných živých organizmov“.

Definícia spája krajinu so životným prostredím. Keďže environmentálne hodnotenie nie je predmetom základného výskumu, ale má zmysel len v riešení praktických environmentálnych problémov, nevyhnutné je, aby sa realizovalo na báze legislatívnych noriem týkajúcich sa zložiek životného prostredia, ich narušenia, resp. kontaminácií a odpadov, ako aj posudzovania vplyvov na životné prostredie.

Vyššie uvedená definícia bola sformulovaná na základe vedeckej (predovšetkým krajinnno-ekologickej) literatúry. Zhodnotením rôznych prístupov k pojmu krajiny hlavne v geografickej literatúre (napr. Krcho, 1974, Mazúr et al., 1980, Otáhel, 1994, Miklós, Izakovičová, 1997, Žigrai, 1998 i ďalších, našich i zahraničných autorov, pozri Drdoš, 2004) možno pojem krajiny definovať ako priestorový dynamický systém materiálnych, integrovaných prvkov s mnohotvárnymi a variabilnými priamymi i nepriamymi vzťahmi, ktorý sa viaže na zemský povrch, je diferencovaný v priestore a čase, má vlastnú vizuálnu kvalitu a je priestorom života človeka; človek svojím metabolizmom je súčasťou krajiny a má k nej aj duchovný vzťah, keďže krajina je jeho domovom; človeka jeho vedomie zároveň vyčleňuje z biosféry a z tohoto hľadiska krajina je predmetom jeho aktivít a má k nej úžitkový vzťah.

U nás krajinu v komplexnom poňatí definuje Otáhel (1994): „krajina je systém materiálnych prvkov, synergicky interagujúcich cez svoje vlastnosti v priestorovej a časovej dimenzii. Jej materiálna štruktúra má svoj vonkajší prejav, obraz, ktorý sa diferencuje v priestore a v čase svojou vizuálnou štruktúrou“. Podobne definuje krajinu aj návrh zákona NR SR o krajinnom plánovaní (2006), podľa ktorého je „časťou územia tak, ako ju vnímajú ľudia, jej charakter je výsledkom činnosti a vzájomného pôsobenia prírodných a/alebo antropogénnych faktorov“.

V koncepcii environmentalistiky (v zmysle Klindu, 1999), súčasťou ktorej je environmentálne plánovanie (pozri Drdoš, 2004, Drdoš et al., 2005) a ktorá je založená na koncepcii trvalej udržateľnosti aj pojem krajiny musí vychádzať z tejto koncepcie. Keďže základným znakom trvalej udržateľnosti je antropocentrizmus (Timašev, 2006 tento pojem nahrádza pojmom sociocentrizmus), aj krajinu chápeme v tomto pohľade (pozri tiež Drdoš, 1983) a ako prvok v systéme človek (spoločnosť) – prostredie (v zmysle sociálnej ekológie a v zmysle pojmu krajiny podľa našej legislatívy). V kontexte environmentálneho hodnotenia cieľom výskumu krajiny je poznať ju ako domov človeka, ako objekt jeho práce i ako existenčnú základňu jeho bytia. Tento prístup je určujúci v hodnotení krajiny pre akékoľvek účely (pozri Drdoš, 2004) a vyžaduje ho aj nový prístup vo výskume systému dvoch rovnocenných prvkov spoločnosť-prostredie.

Isačenko (2006) upozorňuje, že „človek je neoddeliteľná súčasť prírody, no zároveň je v protiklade k nej ako mysliača bytosť a subjekt hospodárskej činnosti. Nie je podriadený krajine, tak ako napr. pôda, alebo živočíšstvo, a preto ho nemožno porovnávať s prírodnými zložkami. Vo výskume sa treba zamerať na konkrétne formy a mechanizmy pôsobenia človeka a krajiny ako dvoch rovnocenných systémov“.

V environmentálnom hodnotení opis krajiny obsahuje všetky jej aspekty (podrobnejšie Drdoš, 2004) - krajina ako systém (geosystém), krajina ako vizuálny obraz (vnem) a krajina ako domov človeka (identita). Zároveň sa krajina opisuje v kontexte sociocentrického systému: prostredie (prírodná, resp. fyzicko-geografická krajina) - ľudská populácia (vybrané demogeografické charakteristiky, zdravie a kvalita života ľudí) – kultúra (aktivity i materiálne výsledky ľudských činností) – v zmysle Fischer-Kowalski, Erb (2006).

Účelom opisu krajiny v environmentálnom hodnotení je podať úplnú charakteristiku krajiny, ktorá je východiskovou bázou pre hodnotenie zmien vplyvom ľudských zásahov a zároveň komparačnou bázou pre porovnanie východiskového stavu s novým stavom, sformovaným realizáciou opatrení na zmiernenie predpokladaných nepriaznivých vplyvov. Tento účel si vyžaduje opis krajiny ako geosystému, tak aj ako vnímaného obrazu a identity. Základným kritériom opisu je princíp trvalej udržateľnosti.

Opisy sú výsledkom analýz prírodných (fyzicko-geografických) a antropogénnych (humánogeografických) zložiek krajiny a s nimi súvisiacich procesov. Procesy (prenosy látok, energií a informácií medzi krajinnými zložkami) sa skúmajú jednak s ohľadom na formovanie krajinných štruktúr (pozri Chorošev, Aleščenko, 2007) a tiež s ohľadom na ich význam pre životný priestor človeka (Egner, 2006). Takými sú napr. prírodné a antropogénne procesy interpretované ako prírodné a antropogénne nebezpečia (v prírodných situáciách nepriaznivo pôsobiace procesy a stavy) a prírodné a antropogénne riziká (nepriaznivé dôsledky zásahov človeka najmä v oblastiach prírodných a antropogénnych nebezpečí) – pozri Drdoš (1992).

Ďalšou významnou časťou opisu krajiny je opis jej štruktúry. Krajina je polyštruktúrna. Polyštruktúrnosť krajiny podľa Choroševa, Aleščenko (2007) je daná tým, že na každej hierarchickej úrovni krajiny sa formuje osobitná štruktúra, podmienená odlišným vedúcim faktorom formovania vzájomných vzťahov medzi krajinnými zložkami, ktoré však nie sú lineárne. Krajina je však polyštruktúrna aj z iných hľadísk. Okrem topickej (vertikálnej) a chorickej (horizontálnej) štruktúry rozlišujeme aj štruktúry podľa stupňa antropogénnej premeny, a to prírodnú (fyzicko-geografickú) a antropogénnu (danú využívaním zeme). Osobitným druhom krajinnnej štruktúry je ekologická (sieť biocentier, biokoridorov, biosegmentov i ďalších znakov významných z hľadiska biodiverzity a výmeny genetických informácií), vizuálna štruktúra (daná vnímaním) a v krajinnom a vôbec environmentálnom plánovaní je významná terciárna štruktúra krajiny (daná rôznymi normami a predpismi, zvlášť o ochrane prírody a krajiny) a štruktúra stresových faktorov (zdroje nepriaznivého pôsobenia na ekosystémy a geosystémy) – podrobnejšie pozri napr. Oťaheľ (1994), Drdoš (1995, 2004), Miklós, Izakovičová (1997), Izakovičová (2001), Čech (2004), Michaeli (2004), Ružička, Mišovičová (2006) a ďalší.

Ďalšou rovnocennou časťou je opis krajinného obrazu, krajinnnej scenérie a identity krajiny (podrobne Drdoš, 1998, 2004). Zatiaľ čo opis krajinného obrazu je interdisciplinárny, opis identity je produktom práce sociológie. Opis environmentálneho stavu krajiny (stupeň narušenia a kontaminácie krajinných zložiek) je výsledkom interdisciplinárnych analýz, v ktorých sú podstatné environmentálne analýzy.

Keďže krajina sa chápe ako životný priestor a prostredie života človeka a ostatných živých organizmov, rovnaký dôraz ako na podmienky ľudskej existencie sa kladie aj na podmienky rastlinstva a živočíšstva (v intenciách zákona o ochrane prírody a krajiny).

Významnou súčasťou informácií o krajine je informácia o únosnosti krajiny (pozri Drdoš, 1990, Drdoš, Kozová, 1992, Drdoš, Hrnčiarová, 2005), ktorá sa v environmentálnom hodnotení získava pomocou analýz citlivosti (i geoekologickej významnosti) jednotlivých prírodných zložiek krajiny a faktorov kvality a pohody života človeka (plánovacia metodika ekologickej únosnosti je založená na LANDEP – pozri Hrnčiarová, et al., 1997). Z porovnania únosnosti krajiny s priestorovým výskytom a intenzitou environmentálnych problémov (kontaminácia a narušenie prírodných zložiek krajiny a jej štruktúry, výskyt

d ďalších nepriaznivých vplyvov, ako hluk, žiarenie a pod.) vyplýva priestorová syntéza zaťaženia krajiny (priestorové rozmiestnenie a veľkosť environmentálnych problémov).

Uvedený komplexný prístup k analýze a syntéze odzrkadľuje holistické ponímanie krajiny, ktoré je nevyhnutné pre rozhodovanie o jej využívaní. Cieľom je získať komplexný obraz o všetkých aspektoch krajiny - ako geosystému, jeho vlastnostiach, štruktúrach, využívaní, ako priestoru života človeka a ostatných organizmov, o jeho hodnotách i miere narušenia. Ide o vystihnúť krajinu ako životného prostredia dotknutej ľudskej komunity.

Informácie o krajine (ako jednom článku systému spoločnosť-prostredie) nevyhnutne dopĺňajú opisy dotknutej ľudskej komunity a jej aktivít, ktoré poskytuje humánna geografia, príp. ďalšie humanitné vedy. Zvlášť významné sú informácie týkajúce sa rôznych aspektov života ľudí, ktoré budú ovplyvnené navrhovanou činnosťou, alebo strategickými zámermi (podrobne Kozová et al., 1995).

Recenzovali: Prof. RNDr. Eva Michaeli, PhD.

Prof. Ing. Jozef Vilček, PhD.

HYGIENIC ASPECTS OF SHEEP BREEDING IN SLOVAK AGRICULTURAL REGIONS

**Eva DUDRIKOVÁ¹, Miroslav HÚSKA², Ján FILKO³,
Lucia POĽAKOVÁ⁴, Eva MICHAEL⁵**

Abstract: Ewe's milk is also very important source of nutritive and energetic components for humans being. Slovakia is a typical country with mountain and submountain area suitable for sheep breeding. Nowadays, three different methods of ewe's milk processing are used: 1. - hand milking and manufacturing of ewe's milk lump cheese without any heat treatment, 2. - machine milking associated with cooling and storage of raw milk on the sheep farm and milk transport to a dairy plant, and 3. - machine milking, cooling and storage of milk, pasteurisation and manufacturing of ewe's milk lump cheese from heat treated milk. All of these methods have their advantages and disadvantages can affect the quality of raw milk mainly from the microbiological viewpoint.

Key words: sheep, milk quality, hygiene

The advantage of all kinds of milk is predominantly in a fact that it is a food-stuff, which is, in a certain volume, able to provide human organism with all nutritive and energetic components (Podhorský, 1993; Maľa a Dudriková, 2000). Therefore it is important to enrich the dairy market with products of another origin than bovine milk (Burdová, 2002). Slovakia is a country with typical mountain and submountain regions so nowadays there are the best conditions for sheep breeding. The first written records concerning breeding dairy ewes from the period of the end of 14th century and the beginning of 15th century indicate this activity. At that time the first chief shepards from Ukraine, Romania and Transylvania came to the region of present day Slovakia. All sheep breeding technology, receiving and processing ewe's milk into ewe's milk lump cheese is kept at many places, so called productive farms (sheepfolds) up to these days.

-
- 1 **Doc. MVDr. Eva Dudriková, PhD.,**
University of Veterinary Medicine, Komenského 73, 041 81 Košice,
e-mail: dudrik@uvm.sk
 - 2 **MVDr. Miroslav Húška, PhD.,**
University of Veterinary Medicine, Komenského 73, 041 81 Košice,
e-mail: huska@uvm.sk
 - 3 **MVDr. Ján Fil'ko,**
University of Veterinary Medicine, Komenského 73, 041 81 Košice,
e-mail: janfilko@orangemail.sk
 - 4 **MVDr. Lucia Poľaková,**
University of Veterinary Medicine, Komenského 73, 041 81 Košice,
e-mail: polakova@umv.sk
 - 5 **Prof. RNDr. Eva Michaeli, PhD.,**
Department of Geography and Regional Development, Faculty of Humanities and
Natural Sciences, University of Prešov, ul. 17. novembra 1, 081 16 Prešov,
tel: 051/757 06 90, michaeli@unipo.sk

Producing of ewe's milk cheese is an old and traditional activity in Slovakia. There are many unsolved problems from the past which are still topical at present. There are actually a few excellent examples from history, where we can commend ourselves for the world priority as Slovak sheep cheese made of ewe's milk processed under sheepfold conditions. (Herian, 2002). The sheep cheese-works, founded in 1797 by the Molecs family in Zvolenská Slatina can serve as an example. They have been producing sheep cheese, the most typical Slovak cheese, since its establishment. The taste and the aroma of sheep cheese are inimitable and predetermine its special place in the market. The products with their traditional taste and quality obtain wide range of customers not only in Slovakia but abroad as well. The sufficient evidence is a fact, that the biggest business partners of above mentioned sheep cheese-works are Hungary and the USA, and the export forms almost one third of the whole production. (Anonymus, 2002). This tradition should be remembered nowadays; advice should be taken and adapted to the present day conditions.

The dairy sheep breeding in Slovakia is an integral part of agriculture and it is included in The Conception of dairy sheep breeding development in Slovakia till 2005, saying not only about the reaching of ewe's milk production but also about export increasing of ewe's milk products, which in 2005 should form 70 % share of its production. Reaching of the expected export of the ewe's milk products and home consumption at the level of population buying ability predicts to produce for one milked ewe 21 kg ewe's milk lump cheese in 2005. Another conception intents is reaching competitive abilities of ewe's milk products.

The increasing of ewe's milk production can be reached by improvement of the breed and cultivation work. In the process of receiving of ewe's milk or processing of the ewe's milk lump cheese it is necessary to reduce loss by keeping technological discipline and increase the quality by using machine milking and provide the accurate milk handling. The demands of the contemporary customers concerning „safe food“ supported by regular legislation (Codex Alimentarius of SR, second part, head eighth „Principles of the correct processing practice“, 1998) force sheep breeders to improve organizational and mainly hygienic conditions for receiving and further processing of ewe's milk. It is inevitable to keep originality and the first class production of the ewe's milk products as well. With respect to the reality of the most Slovak breeds, ideal solution is represented by machine milking, regarding the restrictive possibilities for keeping optimal hygienic conditions at hand milking (e.g. several days' raining, occurrence of dew at the end of the summer), can help to eliminate the amount of the negative factors. Practical experiences show the validity of parlours building which are situated in the centre of the farm while the organisation of grazing is adapted to the particular conditions. Introducing of the machine milking complicates original breeding way of grazing in the distant, remote and broken terrains, as well as the dependence on energy and providing sufficient amount of drink water. These grazing or pasture lands can be used for foraging by herds without market production of milk (Dudriková et al., 2004). Basic definitions, hygienic demands on sheepfolds defined as facilities with low capacity, which are productive farms and dairies for milk processing at the same time and as well sensory, physical-chemical and microbiological demands are given in European Union and national legislations representing the demands of all united customs free market including 450 millions of customers. These demands together with arrangements/alternative ways which provide hygienic conditions of the production

in premises with restricted capacity (Košin, 2002) on the basis of the given criteria thus provide receiving and processing high quality input material – ewe's milk to protect its health harmlessness and hygienic soundness.

Nowadays there are three basic groups of receiving and processing of ewe's milk in Slovakia.

1. Hand milking and manufacturing of ewe's milk lump cheese without any heat treatment.
2. Machine milking associated with cooling and storage of raw milk on the sheep farm and milk transport to a dairy plant,
3. Machine milking, cooling and storage of milk, pasteurisation and manufacturing of ewe's milk lump cheese from heat treated milk under sheepfolds conditions.

Each of the above mentioned methods has its own advantages and disadvantages as well. Each of them can affect the quality of products made of ewe's milk.

Regarding the keeping of the hygienic methods while obtaining and processing of ewe's milk there is a pleasant fact, that the processors of ewe's milk know basic hygienic rules of obtaining and processing of ewe's milk and mostly keep them. At hand milking one can meet using towels for udder cleaning before milking, with pumping out the first squirts, sense considering of milk, activities which are routine at machine milking of ewes, as well as disinfection of teats after milking, although, in this case is the activity used only if clinical changes of mammary gland are visible. Microbiological quality of raw ewe's milk is related to the keeping of the hygienic programme of milking which is consequently reflected in the quality of the final product, i. e. ewe's milk lump cheese or sheep cheese. The following groups of microorganisms occurring in the freshly milked milk of healthy ewe's can be determined: micrococci from the ewe's udder; microorganisms, which do not initiate milk changes and they are not dangerous for a human. They can produce colour changes on the milk surface, e.g. *Pseudomonas* spp., *Sarcina* spp., *Saccharomyces* spp in sporadic cases. The important group creates bacteria of lactic fermentation, predominantly genus *Streptococcus*, *Lactobacillus*, *Leuconostoc*, which are important in light of providing the correct process of fermentation and ripening of ewe's milk cheese. At over ripe of ewe's milk lump cheese bacteria of *Streptococcus lactis* and *Lactobacillus* spp. types affects and cheese reaches pH 4,9. The ripening itself can be of primary character, when protein splitting occurs and of secondary character, when oxidation of lactic acid occurs and as well fat and protein splitting. Furthermore, during ripening itself, there is a grow and enzymatic activity of microscopic fungi genus *Geotrichum*, leavenings and aerobic bacteria on the surface of cheese and anaerobic bacteria in the inside of cheese. By the activity of all this wide group of microorganisms during the ripening of cheese specific sensorial cheese characteristics are created. In the case of infringing hygienic conditions at receiving, treatment and processing ewe's milk into lump cheese unfavourable microorganisms, which can be characterized as unfavourable from the technological point of view and as well unfavourable from the hygienically point of view could be present in ewe's milk. Their occurrence and activity can initiate different deficiencies of ewe's milk lump cheese. Coliform bacteria as an indicator of hygienic insufficiency received at obtaining and treatment of ewe's milk, saprophytic bacteria,

sporulating aerobic and anaerobic bacteria, fungi and leavenings others than *Geotrichum candidum* could be assigned to this group of microorganisms. The last group is made of pathogenic microorganisms (in particular *Salmonella* spp., *Listeria monocytogenes*, *Shigella* spp., *E. coli*, *Staphylococcus aureus*), which can occur in ewe's milk in case of flagrant violation of accurate principles of manufacturing practice and they can become the reason of alimentary toxicoinfection and enterotoxycosis.

Except of coliform bacteria from raw ewe's milk, the most often isolated are staphylococci, mainly *S. capitis*, *S. caprae*, *S. cohnii cohnii*, *S. epidermidis*, *S. haemolyticus*, *S. hominis*, *S. chromogenes*, *S. saprophyticus*, *S. sciuri*, *S. simulans*, *S. warneri*, *S. xylosus*, *S. aureus*. Rarely there can be isolated e.g. *Aerococcus viridans*, *Micrococcus luteus*, *Lactobacillus lactis lactis*, *Escherichia coli*, *Klebsiella oxytoca*, *Pantotea* spp. etc. in ewe's milk. Genii *Cladosporium*, *Penicillium* a *Acremonium*, *Aspergillus*, *Microsporum*, *Paecilomyces* a *Scopulariopsis*. are mostly found from microscopic fibrous fungi in ewe's milk.

There is no need to underestimate the above mentioned groups of microorganisms, which form typical and atypical microflora of raw ewe's milk in any case. In the event of occurring unfavourable microorganisms groups there is mostly relation with hygienic conditions in particular sheepfold. The most often faults, which can be traced in sheepfolds, manufacturing areas and ripening stores from hygienic point of view recently are as follows: spider-web, insufficient weather – strips, presence of undesirable insects, mostly flies, dirty floors and walls, in hot summer season higher temperatures in ripening stores, than is allowed, insufficient hygiene of employees, insufficient cleanness of milk ewe's bodies etc

To summarize, it can be stated, that in spite of different conditions, either economic, climatic or hygienic, Slovak producers and processors of ewe's milk do not have to be afraid of open united European market. Further education, realizing the basic fact i.e. to provide united European market with competitive, not only financially but also with qualitative safe food, is the only chance to keep in the market using the financial support of guaranteed funds, including own inserted financial resources and demanding physical work, which breeding of milk ewes undoubtedly is, they stay in this market and ewe's milk products henceforward will present Slovakia in the trade market.

SUMMARY

The methods of ewe's milk processing used in Slovakia are described. All of these methods have their advantages and disadvantages which can affect the quality of raw milk mainly from the microbiological viewpoint. The hygienic condition observed in dairy sheep farms are discussed, too.

Acknowledgement: The work was financial supported by Grant agency VEGA 1/3493/06, and KEGA 3/4282/06.

References

- ANONYMUS (2002): Bryndziareň a syrárneň s.r.o. Zvolenská Slatina. Mliekarstvo, 33, 3, s. 60.
- BURDOVÁ, O. (2002): Slovenská bryndza na prahu nového milénia. Slov. vet. čas. 27, 2, 103-106.

- DUDRIKOVÁ, E., KOČIŠOVÁ, A., BURDOVÁ, O., RYBÁROVÁ, A. (2004): DDD v podmienkach získavania a spracovania ovčieho mlieka. In: CD-ROM Sb. Referátů VI. Konference DDD 2004. Františkovy Lázně, 5.-7. dubna, 10 s.
- HERIAN, K. (2002): Z histórie výskumu ovčieho syrárstva. Mliekarstvo, 33, 3, 60-61.
- KOŠIN, J. (2002): Predloženie opatrení/alternatívnych spôsobov, ktorými sa zabezpečia hygienické podmienky výroby v prevádzkarniach s limitovanou kapacitou. ŠVPS, Bratislava, príloha č. 4, 1-2.
- MAĽA, P., DUDRIKOVÁ, E. (2000): Správna výživa ľudí. UVL Košice, 232s.
- PODHORSKÝ, M. (1993): Zdravotní přednosti ovčího a kozího mléka. Průmysl potravin, 44, 4, 152-153.

HYGIENICKÉ ASPEKTY CHOVU OVIEC V POĽNOHOSPODÁRSKÝCH OBLASTIACH SLOVENSKA

Zhrnutie

Aj ovčie mlieko má svoje miesto vo výžive ľudí, lebo má v porovnaní s kravským mliekom približne o 60 až 75 % vyšší obsah bielkovín, a takmer dvojnásobný obsah tuku. Zloženie ovčieho mlieka ovplyvňuje plemeno, individualita, laktačné obdobie, zdravotný stav, výživa a ostatné vonkajšie faktory. Bielkoviny z 85 % tvorí kazeín, ovčí albumín sa nezráža syridlom ani kyselinami, ale prechádza pri výrobe syrov do srvátky. Mliečny tuk je vo forme tukových guľôčok o veľkosti 4 - 6 mikrometrov. Má vyšší obsah kyseliny kaprinovej a kaprylovej, ktoré sa podieľajú pri vytváraní špecifickej vône ovčieho mlieka. Obsah mliečneho cukru v porovnaní s kravským mliekom je nižší. Minerálne látky obsiahnuté v ovčom mlieku, najmä vápnik, majú význam pri výrobe ovčieho hrudkového syra. Z vitamínov v porovnaní s kravským mliekom obsahuje ovčie mlieko menej karoténu, viac vitamínu A. Slovensko je krajinou, ktorá má na svojom území veľmi vhodné podmienky na chov mliečnych oviec a výrobu typických mliečnych výrobkov. Zdravotný stav oviec, hygienické a zoohygienické podmienky chovu oviec, hygiena dojenia a prvého ošetrovania a spracovania mlieka, rovnako ako kvalita mlieka a výrobkov z ovčieho mlieka sú pravidelne kontrolované a sú pod stálym veterinárnym dozorom.

Recenzovali: Prof. h.c. prof. Ing. Ondrej Hronec, DrSc.
Prof. Ing. Jozef Vilček, PhD.

ECOLOGICAL ORIENTATED PEST MANAGEMENT VINE (*VITIS VINIFERA*) IN THE SLOVAK TOKAJ REGION

Jarmila EFTIMOVÁ¹

Abstract: Research of the ability to continue growing a vine in the **Tokay region of SR** focuses upon perfecting integrated protection of the vine (further as IPM – Integrated Pest Management). On farm research was carried out in the district of Malá Trňa. In this work, the results of research and implementation of integrated protection of European grapes in the vineyard area of Tokaj during 2004-2006 is presented. The results show that integrated protection of European grapes not only represents direct chemical protection, but also has a complex effect using all kinds of agro-technical measures such as suitable cutting of the vine, targeted green works, grassing between lines and integrated nutrition as part of the integrated production of grapes. The results of research show that targeted integrated protection of vines is more environmentally friendly, protects and improves the environment and provides hygienically flawless material for the production of quality Tokaj wines. Due to a reduction in the number of sprayings, an increase in the quality of grape production and a decrease in the burden on the environment, it brings significant ecological and economic benefits.

Key words: Tokaj wine region, pathogens, IPM, environment, production and ecological benefits

INTRODUCTION

Specialisation and intensification of agriculture, increased number of monocultures, simplified alternation of crops caused disturbance of the dynamic balance of nature, which led to an increase in disease, pests, weeds and contributed towards the acceleration of many environmental problems (Kováč, 1994). The vineyards in the Tokaj region (Slovakia) form a monoculture which has existed there for centuries. Only *Vitis vinifera* and three permitted varieties (cv. Yellow Muscat, cv. Lipovina and cv. Furmint) are cultivated here, which creates a greater premise for more aggressive behaviour of pathogens and an increased occurrence of epidemics (Eftimova, 2002). Conventional chemical protection of vines fulfils the requirements of quick and effective projection, stabilises the quality of the harvest but, at the same time, clogs the environment and can jeopardise human health (Vanek, Vaneková, 1977).

Negative effects of the monoculture in the Tokaj region should be lessened by planning and implementation of a new strategy of integrated protection and production of the varieties of vine and wines. By implementation of the directive for permanently maintainable use of pesticides, all EU member states should support agriculture by low use of pesticides, mainly integrated protection against pests and create conditions necessary for implementation of integrated protection technology. Integrated protection and production of grapes strengthens ecologically safer methods, minimises the adverse and harmful

1 **Ing. Jarmila Eftimová, PhD.,**
Galafruit &CO, s.r.o. Malá Trňa, tel. 0915949821

effects of agro-chemicals to perfect safety measures to protect the environment and human health (Malavolta, Boller 1999).

MATERIALS AND METHODS

Description of the site - the Tokaj vineyard region, in accordance with the law regarding winery and wine production No. 182/2005, is the part located within Slovakia. It lays in the South Eastern to the South West slopes of Zemplínska Vrchovina (Zemplínske Hills), and to the south it is enclosed by the River Roňava. The Tokaj vineyard area is situated in the cadastres of the villages of Malá Trňa, Veľká Trňa, Bara, Černochovej, Čerhov, Viničky and Slovenské Nové Mesto.

Climatic conditions - continental weather is typical for the Tokaj region. The region is warm, slightly dry with a long and sunny autumn and a cold winter. Spring frosts are rare, therefore there is no frost valley in the Tokaj fields. Atmospheric rainfall is unevenly distributed, most is in June, the least in September and October, which is important for creation of the cibeba-raisin.

Soil conditions - the basic principle for categorisation of the fields is a geological base, content of the skeleton and type of soil (Kolárik, 2004). Soils are formed on Mesozoic andesite and rhyolite turfs. Volcanic rocks, by erosion, provide heavier clay soils, rich in potassium which create shallow, gradually drying cover on the sloped areas. The occurrence of the skeleton creates a favourable thermal conditions and microclimate for vines. The most common soil type is brown earth, mainly at the foot of the slope (Vereš, 2002).

Composition of varieties - in accordance with the law regarding winery and wine production No. 182/2005, the basic varieties of European grapes (*Vitis vinifera*) (Furmint, Lipovina, yellow Muscat and the newly permitted variety, Zeta, are allowed. Planted varieties in Tokaj fields should contain 65 - 75%, cv Furmint 15 - 20%, cv Lipovina and up to 10% of yellow Muscat.

Agro-technology - for all grown varieties of vine, Rheinisch - hessen medium guidance is prevalent. Planting is spaced at 2.20 x 1m, with grass between the lines. For younger sowings, the spacing is 2.4m x 0.85m. Cultivation shape - horizontal cordon.

Research of integrated protection of vineyards took place in the areas of the vineyards in Malá Trňa in the location of Pahorok, which lays at an altitude of 150m above sea level. The variant contained three varieties: Furmint, Lipovina and yellow Muscat planted at a ratio of 70:20:10 in an area of 1 ha. Spacing of plants was 2.4 x 0.85m. Cultivation shape - horizontal cordon. Year of planting, 2001. Orientation of lines, north - south. Natural weed vegetation is maintained and cut between the lines.

As a **control sample**, non-treated varieties in an area of 0.05ha were used. On the trial parcel, chemical preparations suitable for integrated production were used. Chemical treatment was also carried out using Vinar towed sprayers (producer, Farm Union Prostějov), with a dose of water of 500 l.ha⁻¹.

In a semi-operational trial, we monitored and evaluated the following:

- Phenophases of the vine.
- Climate conditions and their influence on phenophases of the vine, occurrence of disease and pests.

- By diagnosis, we determined the disease, which we observed visually and microscopically during the vegetation period as well as after completion of the integrated protection.
- The influence of agro-technology upon the occurrence of disease.
- On the basis of fulfilled biotic and abiotic factors, we identified the disease of the vine and we suggested protection.

RESULTS AND CONCLUSIONS

Integrated protection of the vine means scientifically controlled complex protection against the negative influence of harmful organisms of all types (biotic and abiotic factors), shown in a decrease in the quality and quantity of production.

Integrated protection was created by the combination of chemical and biological plant protection with significant in the use of pesticides (but not their total exclusion). It is an organic part of agro-technology for all plants and therefore it must be implemented against individual harmful organisms on the basis of their diagnosis, prognosis, indications and complex protection.

Individual parts of protection must systematically and purposely be sympathetic with currently used agro-technological and special measures, used in the modern technology of plant cultivation. Protection elements must be specified and completed using new technology and the biological knowledge of the research, advanced experience for the particular ecological conditions of the site, agro-technology and biology of growth, in harmony with protection and improvement of the environment. Via analysis of the previous state of the winery in the Tokaj region, we discovered that that greatest expense for the vine production is the cost of its protection and that there is no direct dependence between consumption of pesticides and the amount and quality of production. Another very important factor which we did not observe during research was the negative effect of pesticides upon the environment and public health.

Only a vineyard company which reaches stability in quality of harvest, using reliable and financially less-expensive methods of protection against disease and pests could be profitable. The amount, stability and quality of production, as well as economics and effectiveness of cultivation and production of wine, depends upon the quality of protection of the vine.

During the trial years of 2004 - 2006, we monitored the influence of climatic factors upon the formation of phenophases of vines and its sensitivity towards attacks by disease and pests. We discovered that most important in the planning of new strategy in the battle against disease and pests, from an environmental viewpoint, is a thorough knowledge of their occurrence in the area. In the closed area of the Tokaj vineyards, where varieties of Furmint, Lipovina and yellow Muscat are repeatedly grown, regarding the appearance of disease, the European grape is more or less attacked by three significant diseases which are *Plasmopara viticola* (Berk. et Curt.) Berk. et de Toni, *Erysiphe necator* Schwein. A., *Botrytis cinerea* Pers. – teleomorphic stage *Sclerotinia fuckeliana* (De Bary) Whetzel.

The most common pests in the Tokaj region are the grape leaf rust mite (*Calepitrimerus vitis*), grape leaf blister mite (*Colomerus vitis*), European Red Mite (*Panonychus ulmi*) and twospotted spider mite (*Tetranychus urticae*), grapevine moth (*Lobesia botrana*) and European grape berry moth (*Epoecillia ambiguella*). Caterpillars of the mentioned

pests damage the blossom and berries of the vine, and create an entry gate for secondary pathogens.

Monitoring of the appearance of disease and pests has a significant role in the complex protection of European grapes. Successful implementation of protection of a vine also depends upon microscopic monitoring of disease, knowledge of their life cycles and their behaviour depending upon climatic conditions. This knowledge is the basis for preparation of a prognosis of the appearance of disease and pests, which provides sufficient time for planning protective treatment of vines.

The exact term for optimal treatment was specified by signals. For creation of long or short term prognoses as well as for signalling, we monitored the climatic conditions obtained from SHMÚ- Košice (Slovak Hydro Meteorological Institute) and by own measurement of temperature parameters, relative air humidity and humidity of leaves. Measurement was carried out using a device from Luft GMBh, which monitors the required parameters. For reliable prognosis of disease and influx of pests in the entire Tokaj region, it is necessary to build a network of meteorological stations, provide their transfer into a central process for the entire area.

We organised targeted research of vine protection in order to decrease admission in the wine bushes during the observed years. We gradually moved from conventional chemical protection to an integrated protection of European grapes (tab. 1, 2, 3, 4).

In 2004, on the trial parcel, we preventatively chemically treated the vines in accordance with the development phases, without considering the biology of phytopathogenic fungi. We used the GALATI Vitis computer program, used by Galafruit & Co. s.r.o. since 2002, which predicted diseases (perenospora, *Erysiphe* and grey mildew) and signalled the need for chemical protection. Agro-climatic characteristics were taken from the meteorological station at Somotor, which corresponds geographically with the Tokaj region. Rainfall was measured directly in Malá Trňa. Despite the fact that the GALATI Vitis computer program should reliably predict disease and term of chemical treatment, the production of grapes was a sub-standard quality due to decay of the grapes. We discovered that the GALATI Vitis computer program was unreliable for the particular company. It was also probably due to the fact that meteorological data did not correspond with the microclimate of the site in Malá Trňa and the program predicted creation of infection although in reality, the conditions for its creation did not exist.

The drawbacks of this method could be eliminated by building a network of meteorological stations in the area of the Tokaj vineyards, which would objectively and precisely give information regarding weather development, and should also measure the length of time of humidity of leaves. Despite intensive chemical treatment, the health of the vine was not satisfactory as some chemical treatment was carried out before or after the infection occurred. Similar results were recorded in Szaksárd (Hungary) where from 1993-1997 the GALATI Vitis program was applied. FUZI, (2003) discovered that in 1994 and 1996, the prognoses did not correspond to the real infection by *Erysiphe* and did not take into account primary ascosporic infections.

In the years following the research, in 2005 - 2006 we did not therefore use the "GALATI Vitis" program for protection of vines. For prognosis and signalisation we used data obtained from a LUFT GMBh device which monitors temperature, length of humidity of leaves and relative air humidity of the vine directly in the trial field. The used protection is shown in tab. 2.

In our research in 2006, we focused our attention upon the primary source of infection of *Erysiphe* on the trial vine land and we adjusted the protection of the vine in line with newly discovered facts. The exact term of optimal treatment maintained the trial varieties in good health whilst decreasing the number of sprayings in comparison with 2004. We managed to maintain very good health on the trial parcel thanks to good signalisation, suitably chosen preparations and mainly thanks to new active compounds which were not previously used in this area.

In 2005 - 2006, we gradually selected the chemical preparations in order that one preparation would repress both diseases and we would not exceed the limit stated in integrated production.

Detailed measurements and more precise characteristics of individual types of fungi occurring in Tokaj varieties of vine confirmed that effective protection against *Erysiphe* should be controlled on the basis of the changed dynamic of the development of *Erysiphe* whilst taking into account the dominance of cleistothecia. A change in the dynamics of the development of *Erysiphe* via ascospores which are released from cleistothecia and are a source of infection, to date only existed in Slovakia on a hypothetical level. The results of our research from 2004 - 2006 proved their existence since in 2005 and 2006, they became the primary source of infection. The results proved that the cleistothecia form as a primary source of infection of *Erysiphe* plays an important epidemiological role in protection of the vine. Massive creation of cleistothecia, mainly on the face of the leaves at the end of summer continued, and became a source of early spring infection. Therefore, early identification of its commencement via the prognosis is very important. It was only in 2004 that we discovered a strong appearance of *Erysiphe* from mycelium in buds. The abovementioned research corresponded with the results in Hungary, published by DULA (2005). The authors PEARSON and GADOURY (1987) reached a similar result, which confirmed that the primary sources of *Erysiphe* infection in New York are ascospores released in the spring period from hibernating cleistothecia. Similarly in Italy, CORTESI and Co. (1999), in a three-year trial, discovered that in monitored planting, there was cleistothecia on 86%, on 7% *Erysiphe* did not occur and on 33% of planting both forms of hibernation, mycelium and cleistothecia were present.

In trials in 2005 - 2006, we verified Gubler's method of statement of a primary *Erysiphe* infection and confirmed its reliability. Other conidia infections were calculated using an index method. On the basis of this knowledge, the occurrence of *Erysiphe* infection can be reliably predicted and the vine can be maintained in good health using a suitably selected preparation. The key task during protection of the vine is the determination of the primary source of infection, as this conditions the different methods of protection.

When planning chemical protection focused on repression of *Erysiphe*, new technology should be designed which would reliably protect the bunches against disease and at the same time eliminate autumn cleistothecia infections on the leaves. For the future, it would be suitable to also try autumn application of exterminating sprays which are applied against scabbing of apple trees (Eftimová, 1998).

During application of spraying compounds reliable, effective technology is required which provides perfect application of the preparation in order to cover the entire vine. In 2005 - 2006, we were satisfied with the addition of wetting agent Silwet L-77 into the spraying preparations with which we achieved perfect covering of the leaves. From the

achieved research results, we recommend use of contact preparations before blossoming and during the period of closing of bunches. It is also very important to alternate the active compounds to avoid fungicidal resistance.

Grassing between the lines also helped with operative management of protection, which at the same time becomes a significant creator of a favourable microclimate which partially eliminates failure in cultivation of vines in a monoculture. Natural weed flora is present in the vineyards, which are mulched. In order to rationally maintain the weeds under the level of their harmfulness, we consider the technology of a combination of mechanical and herbicidal methods of repressing and removal of weeds as the most suitable. The diversity of freely living organisms in vineyards is influenced by the technology of cultivation of vines. Implementation of a system of integrated production of vines in the Tokaj region, which maintains and extends the area of semi-natural biotopes therefore creates conditions for maintainable development of the environment, the layout of the countryside, keeps and increases soil fertility, increases biodiversity of flora and fauna on the vineyard land in the Tokaj region.

Acknowledgement: This work was financially supported by Science and Technology Assistance Agency under the contract no. APVT 20-026604 „Determinácia agroekologických a agroenviromentálnych faktorov trvalo udržateľného rozvoja svetovo významného tokajského vinohradníctva a vinárstva“.

References

- ACKERMANN, P. et al. (1992): Smernice integrované produkce hroznu a vína, Zprávy ÚKZÚZ OZPMOR, Brno.
- CORTESI, et al. (1999). Overwintering of *Uncinula necator* and epidemics of grape powdery mildew. J. Plant Pathol. 81:230.
- DULA, B. (2005): Heves Megyei NTSZ, Eger, Növényvédelmi, Tudományos Napok, Budapest (*Vitis vinifera*)
- EFTIMOVÁ, J. (2002): Regulácia škodcov a chorôb v ekologickom poľnohospodárstve. Zborník: Ekologické poľnohospodárstvo a ekonomika bioproduktov. Vydal: Agrotar Nitra, 2002 s.118-121 ISBN 80-88943-15-9
- EFTIMOVÁ, J. (2008): Integrovaná ochrana viniča hroznorodého (*Vitis vinifera*) vo vinohradníckej oblasti Tokaj. Vine (*Vitis vinifera*) Integrated Pest management in the Slovak Tokaj region Agrochémia 1/2008 1335-2415 s.20-25
- FADEJEV, J.N. NOVOŽILOV, K.V. (1986) Integrovaná ochrana. Vydala Príroda n.p. Bratislava 1986, s. 11-35, Nitrianské tlačiarne. Č. publikácie 6104-SÚKK 1729/I-85
- FUZI, I. (2003): Környezeti tényezők szerepe az *Uncinula necator* (SCHW.) BURR. Járványdinamikájában, Keszthely 2003, dizertačná práca.
- KOVÁČ, K. (1994): Sustainable Agriculture. In: Kováč- Göransson et al., 1994. Integrated and Ecological arable farming systems. Piešťany : RICP, s. 7-15, ISBN 80-900515-7-X.
- VANEK, G., VANEKOVÁ, Z. (1977): Ochrana viniča. Vydala: Príroda Bratislava 1977. Tlačiarne SNP n. p., Neografia Martin Číslo publikácie 3967
- VANEK, G. a kol. (1996): Vinič 2 ochrana, Vydala Príroda, Bratislava, ISBN80-07-00758-X

Tab.1: Chemical attendance of vine in 2004, Varieties : Furmint, Lipovina, Muškát žltý in the area -Pahorok- Malá Tíňa

Vegetative stage	Spraying date	Diseases	Chemical preparate	Active substance (producer)	Dose per ha (kg, l)
Shouts 0.4-0.5m	18.5.2004	powdery mildew downy mildew	Kumulus WG Mancosan 80WG	Síra, BAS Mancozeb, DAS	3,50 2,00
Before flowering	8.6.2004	powdery mildew downy mildew	Shavit71,5W P	Folpet, triadimenol, ART	2,00
Flowering	17.6.2004	downy mildew	Acrobat MZ WG	Dimetomorph mancozeb	2,00
At the end of flowering	23.6.2004	powdery mildew downy mildew	Falcon 460EC Folpan 80WDG	Spiroxamine, tebukonazole, triadimenol, BAY folpet, ART	0,30 2,50
Grapes of peas size	8.7.2004	powdery mildew botrytis bunch rot	Bayleton 25 WP Euparen multi	Triadimefon BAY Tolyfluanid, BAY	0,20 2,50
Bunches closing	20.7.2004	powdery mildew downy mildew	Falcon 460EC Folpan 80WDG	Spiroxamine, tebukonazole, triadimenol, BAY folpet, ART	0,30 2,00
	4.8.2004	powdery mildew downy mildew	Cuproxat SC, FW Karathane LC	CuSO ₄ FNA Dinocap DAS	5,00 0,50
Before grapes softening	24.8.2004	botrytis bunch rot powdery mildew	Ronilan WG Kumulus	Vinclozolin, BAS Síra, BAS	1,00 5,00

Tab. 2: Chemical attendance of vine in 2005, Varieties : Furmint, Lipovina, Muškát žltý in the area-Pahorok- Malá Trňa

Vegetative stage	Spraying date	Diseases	Chemical preparate	Active substance (producer)	Dose per ha (kg, l)
Shouts 0.4-0.5m	16.5.2005	powdery mildew downy mildew	Kumulus WG Mancosan 80WG	Síra, BAS	4,00
				Mancozeb, DAS	2,00
Before flowering	7.6.2005	powdery mildew downy mildew	Falcon 460EC Folpan 80WDG	Spiroxamine, tebukonazole, triadimenol, BAY	0,50
				folpet, ART	2,50
At the end of flowering	28.6.2005	powdery mildew downy mildew	Cabriotop Silwet L 77 Harmavit	Metiram, pyraclostrobin, BAS	2,00
				Heptamethyltrisiloxal, Cl Liquied fertiliser	0,25 3,00
Grapes of peas size	11.7.2005	powdery mildew downy mildew	KumulusWG Shavit71,5W P Siwet L 77 Harmavit	Síra, BASF Folpet, triadimenol, ART	2,00 2,50
				Heptamethyltrisiloxal, CRO Liquied fertiliser	0,25 2,50
Bunches closing	28.7.2005	powdery mildew botrytis bunch rot	Falcon 460EC Euparen multi	Spiroxamine, tebukonazole, triadimenol, BAY	0,30
				tolylfluanid, BAY	2,50
Before grapes softening	10.8.2005	Botrytis bunch rot downy mildew	RonilanWG	Vinclozolin, BAS	1,00
			Cuproxat SC	CuSO4 FNA	4,00

Tab. 3: *Integrated protection of vine in 2006, Varieties : Furmint, Lipovina, Muškát žltý in the area -Pahorok- Malá Tíňa, type A*

Vegetative stage	Spraying date	Diseases	Chemical preparate	Active substance (producer)	Dose per ha (kg, l)
3 lleaf	9.5.2006	powdery mildew	Thiovit Jet	Síra 80%, SYS	6,00
		downy mildew	Folpan 80WDG	Folpet ,ART	2,00
6-leaf	22.5.2006	powdery mildew	Talendo	Proquinazid DUP	0,50
		downy mildew	Tanos50WG	Cymoxanil famoxadone DUP	2,50
		Colomerus vitis	OrtusSC,	Fenpyroximate,BRA	1,00
			Harmavit	Liquied fertiliser	3,00
Before flowering	1.6.2006	powdery mildew	Thiovit Jet	Síra 80%, SYS	5,00
		downy mildew	Cabriotop	Metiram,pyraclostrobin,BAS	2,00
			Silwet L 77	Heptamethyltrisiloxal,CRO	0,25
			Harmavit	Liquied fertiliser	3,00
At the end of flowering	26.6.2006	powdery mildew	KumulusWG	Síra 800g/kg,BAS	4,00
		downy mildew	Shavit71,5WP	Folpet,triadimenol,ART	2,00
			Silwet L 77	Heptamethyltrisiloxal,CRO	0,50
			Harmavit	Liquied fertiliser	3,00
Grapes of peas size	10.7.2006	powdery mildew	Shavit71,5WP	Folpet,triadimenol,ART	2,00
		downy mildew	Siwet L 77	Heptamethyltrisiloxal,CRO	0,25
Bunches closing	25.7.2006	powdery mildew	KumulusWG	Síra, BASF	5,00
		downy mildew botrytis bunch rot	Shavit71,5WP	Folpet,triadimenol,ART	2,00
Before grapes softening	15.8.2006	botrytis bunch rot	Ronilan WG,	Vinclozolin,BAS	1,00
		downy mildew	Champion 50 WP	hydroxid Cu ARA	4,00

Tab. 4: *Integrated protection of vine in 2006, Varieties : Furmint, Lipovina, Muškát žltý -Pahorok- Malá Trňa, type B*

Vegetative stage	Spraying date	Diseases	Chemical preparate	Active substance (producer)	Dose per ha (kg, l)
3 leaf	9.5.2006	powdery mildew downy mildew	Thiovit Jet	Síra 80%, SYS	6,00
			Folpan 80WDG	Folpet ,ART	2,00
6-leaf	22.5.2006	powdery mildew downy mildew Colomerus vitis	Talendo	Proquinazid DUP	0,50
			Tanos50WG	Cymoxanil famoxadone DUP	2,50
			Thyplodromus pyri Harmavit	Dravý roztoč(introdukovaný) Liquied fertiliser	3,00
Before flowering	1.6.2006	powdery mildew downy mildew	Thiovit Jet	Síra 80%, SYS	5,00
			Cabriotop	Metiram,pyraclostrobin,BAS	2,00
			Silwet L 77 Harmavit	Heptamethyltrisiloxal,CRO Liquied fertiliser	0,25 3,00
At the end of flowering	26.6.2006	powdery mildew downy mildew	KumulusWG	Síra 800g/kg,BAS	4,00
			Shavit71,5WP	Folpet,triadimenol,ART	2,00
			Silwet L 77 Harmavit	Heptamethyltrisiloxal,CRO Liqueid fertiliser	0,50 3,00
Grapes of peas size	10.7.2006	powdery mildew downy mildew	Shavit71,5WP	Folpet,triadimenol,ART	2,00
			Siwet L 77	Heptamethyltrisiloxal,CRO	0,25
Bunches closing	25.7.2006	powdery mildew downy mildew botrytis bunch rot	KumulusWG	Síra, BASF	5,00
			Folpan80WDG Ibefungin	Folpet ,ART Bacilus subtilis,k-711-subtilin	2,50 4,00
Before grapes softening	15.8.2006	downy mildew	Champion 50 WP	hydroxid Cu ARA	4,00

EKOLOGICKÁ ORIENTÁCIA OCHRANY VINIČA HROZNORODÉHO (*VITIS VINIFERA*) VO VINOHRADNÍCKEJ OBLASTI TOKAJ

Zhrnutie

Výskum udržateľnosti pestovania viniča v tokajskej oblasti SR je zameraný na program zdokonalenia integrovanej ochrany viniča a zníženia dopadu pesticídov na environment. Poloprevádzkové pokusy (on farm research) sa realizovali v katastri Malá Trňa. V príspevku sú prezentované výsledky výskumu a implementácie integrovanej ochrany

viniča hroznorodého vo vinohradníckej oblasti Tokaj v rokoch 2004-2006. Z výsledkov vyplynulo, že integrovaná ochrana viniča hroznorodého predstavuje nielen priamu chemickú ochranu, ale pôsobí komplexne s celým radom agrotechnických opatrení ako je vhodný rez viniča, cielené zelené práce, zatrávnenie medziradia a integrovaná výživa ako súčasť integrovanej produkcie hrozna. Výsledky výskumu ukázali, že cielená integrovaná ochrana viniča je k prírode šetrnejšia, chráni a zlepšuje životné prostredie a zabezpečuje hygienicky nezávadnú surovinu pre výrobu kvalitných Tokajských vín. Vzhľadom na redukcii počtu postrekov, zvýšenie kvality produkcie hrozna a zníženie záťaže prírodného prostredia prináša značné ekologické a ekonomické benefity.

Recenzovali: Prof. h.c. prof. Ing. Ondrej Hronec, DrSc.
Prof. RNDr. Eva Michaeli, PhD.

THE HUFF'S PROBABILITY MODEL AND ITS APPLICATION ON SELECTED LARGE-AREA RETAIL UNITS IN KOŠICE

Jana FERTAĽOVÁ¹, Pavol VARGA²

Abstract: *The behaviour of trader as well as consumer is changing. Supranational trade networks with their large hypermarkets are penetrating our trade. In last four years the share of hypermarket shopping in Slovakia has increased more than twice, and the share of small shops and counter shops is decreasing despite the fact that they keep the highest average annual shopping frequentation. Hypermarkets continuously make a profit of new customers.*

Key words: *retail, shopping, shopping behaviour, Slovakia, hypermarket, retail store, intensity of attendance, accessibility area of attendance, the Huff's probability model*

INTRODUCTION

The construction of large-area retail units in Slovakia has consequently changed the shopping behaviour of its inhabitants. They start to prefer the individual car transport and reduce the public or pedestrian one, since the shopping centres concentrate themselves mostly in the city outskirts. People usually do shopping in the afternoon and in the evening. Saturday and Sunday are the most popular days in week for shopping. Thus, we can see that the former models of shopping behaviour are changing and become more identical with those of the western Europe.

Mowen (1987) considers that the discipline of consumer's behaviour is dealing with generation of decisions concerning the processes of acquirement, consumption and use of goods, services, and ideas. The creation of decision is, as he writes, an important basis, whereas it often occurs in groups, families, in firm's management etc. The acquirement process includes the communication, remembering, and considering acquired information (Mowen, 1987).

BEHAVIOURAL GEOGRAPHY

Behavioural geography, accordind to Walmsley and Lewis (1984), is trying to find a relation between consumers' behaviour and spatial structure of retail trade environment. It used to be supposed that a man prefers the minimal mobility towards shopping and behaves in favour of economic nature. Later studies has proved that a part of consumers select the place of shopping not only by the goods offer and services, size, attractiveness and good atmosphere of the shop. Researches have revealed that people do not respect the logic of objectiveness and behave irrationally (Walmsley - Lewis, 1984). It means

1 **RNDr. Jana Fertaľová, PhD.,**

Department of Geography and Regional Development, Faculty of Humanities and Natural Sciences, Prešov University 17. novembra 1 080 01 Prešov, Slovak Republic, e-mail:jankageo@unipo.sk

2 **Bc. Pavol Varga,**

Student of Faculty of Humanities and Natural Sciences, Prešov University 17. novembra 1 080 01 Prešov, Slovak Republic, e-mail:pallito@pobox.sk

that if there was built a supermodern shopping centre with perfect services and low prices near the city, not all people from its surroundings would do their shopping there, and on the other hand, many people from more distant areas might do shopping there (Szczyrba, 2002, 2005).

HUFF'S PROBABILITY MODEL

The Huff's probability model is based on a classic gravitation model, which can be considered as the earliest type of spatial models, and which was formulated on the basis of analogy with the Newton's universal gravitation law. Gravitation models were first used only for demographic research and it was only after 1930's that they were used also for definition of retail and services centres' tributary areas. Among others, following Slovak authors worked in the field of application and issues of gravitation model: Bezák (1999, 2000), Bezák – Michniak (1999), Kusendová (2001), Kusendová – Labuda (2002), Paulov – Poláček (1979, 1982), Paulov (1986b, 1991, 1993). Hebák (1972) used the possibility of application of gravitation model in quantification of retail tributary area, Čadková – Krásný (1985) used it for definition of the tributary area of service centres for citizens.

The best known gravitation model is the so called Reilly's law of retail gravitation. It is a formula stating that two bigger areas divide among themselves the purchase demand of a town situated between them, suggesting that customers are drawn from the intermediate town at or close to the point of equal probability, approximately in direct proportion to the population of the two shopping areas and in inverse proportion to the squares of the distance between the town and the two shopping areas. This model does not take into account all the aspects that influence the division of smaller intermediate town population spending between the two shopping areas (transport possibilities, communication network quality, population density, trade and social activity of the retail municipalities, geographical conditions, social and income differentiation of customers, etc. (Pražská – Jindra et al., 1998, Szczyrba 2005)). This basic model can distort reality, as it considers the sphere of influence of shopping areas to be closed and mutually exclusive. However, the research proved the existence of intermediate areas the population of which commutes more or less regularly to two or more retail centres. The definite breaking point between particular centres can be used especially in the situation where the distance from the retail centres is the determining factor and where the choice is minimal (i.e. mainly in countryside environment). In more urbanised areas more retail centres operate in individual municipalities and thus the possibility of choice is growing. *Huff's probability model* reacts to this fact. It considers size of the shop, defined by the shopping floor area, and its temporal accessibility. It defines proportion of purchase journeys from a particular municipality to all retail centres of the analysed area. This proportion can be considered a probability that a certain retail centre will be a target shopping area for the inhabitants of the municipality. This model can be applied broadly and it has been the most widely used model since the 1970's (e.g. for localisation of retail units and service centres). However, even in spite of the fact that it is a widely used model, content of individual parameters remains problematic. The model (Pražská – Jindra et al., 1998, Szczyrba 2006) is stated as:

$$P(C_{ij}) = \frac{\frac{S_j}{T_{ij}\lambda}}{\sum_{j=1}^n \left[\frac{S_j}{T_{ij}\lambda} \right]}$$

Where

- $P(C_{ij})$ – probability that the municipality i inhabitants will shop in the retail centre j
 S_j – size of the retail centre j given by shopping floor area
 T_{ij} – temporal accessibility of the retail centre j from municipality i
 λ – Parameter, which changes according to hierarchical level of the retail area (empirically)

APPLICATION OF THE MODEL TO SELECTED LARGE-AREA RETAIL UNITS IN KOŠICE

For this article, the Huff's model was applied to 4 particular large-area retail units in city of Košice. The aim of this application was to compare the probability of inhabitants of particular city parts (wards) shopping in a selected large-area retail unit. Temporal accessibility of retail centre j from municipality i was replaced by the spatial distance of retail centre j from municipality i in calculation of probability. The reason for this replacement was the lack of objectiveness of the temporal accessibility data, as this is very difficult to measure due to various reasons. The model was applied to 4 different retail units, one of which is the largest retail-centre in Košice (Optima) and the remaining three are less important retail (discount) units Lidl, due to both their shopping-floor area and the variety of offered goods. Since retail centre (mall) and discount retail unit differ in many aspects, the aim of this paper is to compare gravitation of individual stores.

Main differences between large-area retail stores Optima and Lidl:

- Optima is a retail centre (mall), Lidl is a discount retail unit
- Optima offers a wider variety of goods than Lidl stores
- There are 89 smaller shops situated in the shopping gallery of Optima retail centre, Lidl stores do not have a shopping gallery
- Area of Optima is 36000 m², area of a Lidl store is 1200 – 1400 m²
- The developer of Optima retail centre was Optima Corporation Bratislava. The main partners of the project were TK Development and Ahold Real Estate. TK Development was responsible for building of the shopping gallery, Ahold was responsible for Hypernova hypermarket. All retail units Lidl in Slovakia are operated by a trading company Lidl Slovenská republika, v.o.s. There are 60 Lidl discount retail units in Slovakia at present (3 in Košice) and 1 logistic centre in Nemšová
- Shopping floor area of Optima is divided between the shopping area of Hypernova store (15 000 m²) and shopping gallery (21 000 m²), shopping area of Lidl represents solely the shopping floor of the discount retail unit

City of Košice is divided into 22 city parts (wards) and each of these represents parameter i , which is a parameter of a location from which the distance to the analysed retail unit is measured (and in parameter T_{ij} temporal accessibility was replaced by distance). Average distances of each city ward ((maximum distance + minimum distance)/2) from a selected large-area retail unit were used in calculations.

According to the Huff's model, the highest probability that Optima centre will be a target for shopping of its inhabitants are in the city parts Luník IX, Pereš and Lorinčík. This is determined by both the closeness of these parts to the retail centre and the fact that no other store, included in this research, is situated in these city wards. In this case we can see the disadvantages of this theoretical model, since it does not take into account some factors that influence the results of the research. In case of Luník IX this factor is a social pattern of its inhabitants. These inhabitants usually shop in other large-area stores, which offer cheaper goods yet their range of goods is smaller and less varied (e.g. Kaufland or Lidl). It is interesting that the city ward, in which Optima is situated, did not reach the highest number of probability calculations according to the Huff's model. This is caused by location of other retail units in this area. City ward JUH, in which Optima is located, is also a city ward with the highest number of large-area stores in the city of Košice, and thus the probability of shopping here is not as high as in Luník IX, Pereš and Lorinčík parts, where none of the analysed retail units are situated. The result of the lowest probability of shopping in Optima retail centre was also very interesting. The lowest probability was not reached by the most distant parts of the city, but by the city ward Džungľa. This result was influenced mainly by the fact that two relatively large stores are situated in this part of the city (Tesco and Baumax) and also the fact that Optima is one of the most distant stores from this part of the city. Similar probability results for the city ward Džungľa were calculated in case of the Lidl retail unit situated in the city ward of Dargovských hrdinov. Even though it is in a close proximity of this retail unit, the probability of shopping there is much lower than in other neighbouring parts of the city. It is caused by the fact that large-area retail stores are situated in this smallest city ward Džungľa. As expected, the highest probability, according to the Huff's model, was reached by the city ward of Dargovských hrdinov, where the retail unit is also situated. The lowest probability of shopping is not in the most distant part of the city but in the city ward Luník IX. This is caused by the closeness of other large stores (in the city ward JUH).

In case of Lidl retail units in the KVP and Západ housing estates, the lowest probability of shopping again applies to the Džungľa city part, due to the same reasons as mentioned above in case of Optima retail centre. There were no unexpected results in other calculations.

All calculations are reflected in the maps in Picture 1. As it can be seen, the probability of shopping depending on distance decreases more slowly in case of Optima retail centre (Picture 1A). On the other hand, it can be seen from pictures 1B, 1C and 1D that the probability of shopping decreases more rapidly depending on distance. The size of the stores has a significant influence on this as well.

Huff's model offers a general and theoretical Picture of probability of shopping in a particular retail store. Yet, in its application, we have to take into account the factors as e.g. social, cultural, demographic and economic aspects; accessibility of the stores; and many other factors, which influence this theoretical conception. These, however, can not be incorporated into any model, as every environment is very specific and there are no general expectations and findings that apply in all cases. Therefore, the results of the questionnaire research implemented at present will be used for comparing of the results, using the Huff's probability model of shopping in selected retail units in a specific city ward of Košice, with the outcome of the research.

Acknowledgement: This paper we prepared with the contribution of the grants: VEGA 1/3050/06 „Kvalita života - konceptuálny rámec komplexnej geografickej interpretácie priestorovej štruktúry mesta“ (Head of project: R. Matlovič), VEGA 1/0210/08 „Špecifické postavenie regiónu východné Slovensko v kontexte regionálnych disparít Slovenskej republiky“ (Head of project: R. Klamár)

References

- BEZÁK, A. (1999): Comparing the approaches to migration flow projections: The case of interregional migration in Slovakia. In: Acta Facultatis Rerum Naturalium Universitatis Comenianae, Geographica Supplementum No. 2/I, 1999, Bratislava, P. 11 – 22.
- BEZÁK, A. (2000): Inrerregional migration in Slovakia: some tests of spatial interaction models. In: Geografický časpis, vol. 52, 1999, No 1.
- BEZÁK, A., MICHNIAK, D. (1999): Niekoľko predbežných úvah o dostupnosti okresov miest na východnom Slovensku. Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešovensis, Folia Geographica, 3, p. 191-197.
- ČADKOVÁ, B., KRÁSNÝ, T. (1985): Příspěvek k modelovému vymezení spádu do středisek občanské vybavenosti. Sborník ČSGS, 90, č. 4, Praha, s. 269 – 278.
- FERTAĽOVÁ, J. (2005a): Regionálnogeografické aspekty hodnotenia vývoja maloobchodu na Slovensku po roku 1989. In: Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešovensis, Prírodné vedy, XLIII., Folia geographica 8. Prešov: FHPV PU, 2005, p. 5-12.
- FERTAĽOVÁ, J. (2005b): Some methodological issues in classification of retail stores (with examples from European countries). In: Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešovensis, Prírodné vedy, XLIII., Folia geographica 8. Prešov: FHPV PU, 2005, p. 13-19, ISSN 1336-6157.
- FERTAĽOVÁ, J., SZCZYRBA, Z. (2006a): Globalisation in the Czech and Slovak retail: Common and Specific Features. In.: Siwek, T., Baar, V. (eds.): Globalisation and its Impact to Society, Regions and States (sborník příspěvků z mezinárodní konference). Ostravská univerzita, Ostrava, s. 164-173, ISBN 80-7368-256-7.
- FERTAĽOVÁ, J., KLAMÁR, R. (2006): Hodnotenie návštevnosti vybraných veľkoplošných predajní. In: Folia geographica 10. Prírodné vedy. pp. 140-155, ISSN 1336-6157.
- HEBÁK, P. et al. (1972): Možnosti využití gravitačních modelů pro kvantifikaci nákupního spádu. VÚO, Praha. p. 152.
- KRIŽAN, F. (2005): Analýza dostupnosti vybraných maloobchodných sietí Slovenska (příkladová štúdia siete Billa). Zborník zo VI. vedeckej konferencie doktorandov a mladých vedeckých pracovníkov, Nitra, pp.237-240, ISBN 80-8050-813-5.
- KRIŽAN, F. (2005): Meranie dostupnosti v geografii. Geografické aspekty stredoevropského priestoru, Brno: Masarykova univerzita v Brne, p. 267-287.
- KUSEDOVÁ, D. (2001): Použitie modelu populačného potenciálu vo výskume regionálnej diferenciácie Slovenska. In: Súčasný populačný vývoj na Slovensku v európskom kontexte. Zborník príspevkov 8. demografickej konferencie, Bratislava: Slovenská štatistická spoločnosť, 2001, p.90 – 94.
- KUSEDOVÁ, D., LABUDA, R. (2002): Gravitačné modelovanie dochádzky za prácou v okrese Veľký Krtíš. In: Geografické informácie 7, Zborník z XIII. Kongresu SGS I. diel – Slovensko a integrujúca sa Európa. P. 126-139. ISBN 80-8050-542-X.

- MOWEN, J. (1987): Consumer Behavior. New York, Macmillan.
- PAULOV, J., POLÁČIK, Š. (1979): Kalibrácia a testovanie gravitačného modelu na migračných dátach. In: Acta Facultatis Rerum Naturalium Universitatis Comenianae, Geographica Nr. 17, 1979, Bratislava, p. 209 – 232.
- PAULOV, J., POLÁČIK, Š. (1982): Interakčný model: Kalibrácia a testovanie. In: Studia Geographica, 1982, Nr. 74, p. 75 – 94.
- PAULOV, J. (1986): Gravitačný model: Analytický nástroj štruktúrneho výskumu v geografii. Acta Facultatis Rerum Naturalium Universitatis Comenianae, Geographica Nr. 25, 1986, Bratislava, p. 79 – 99.
- PAULOV, J. (1991): Priestorová interakcia a jej modelovanie. Habilitačná práca. Bratislava, PrirF UK.
- PAULOV, J. (1993): Entropia v urbánnej a regionálnej analýze: konceptuálny rámec a základy aplikácie. In: Geographia Slovaca, 1993, Nr. 2, Bratislava, Geografický ústav SAV.
- PRAŽSKÁ, L., JINDRA, J. et al. (1998): Obchodní podnikání – Retail management, Management Press, Praha. ISBN 9 788085943481. p. 880.
- SZCZYRBA, Z. (2002): Shopping gravity of large-scale stores – example of Terno Olomouc hypermarket (Contribution to the study of the problematic). Geographica 37, p. 91 – 96.
- SZCZYRBA, Z. (2005): Maloobchod v ČR po roce 1989. Vývoj a trendy se zaměřením na geografickou organizaci. PřF Univerzity Palackého Olomouc. p. 126, ISBN 80-244-1274-8.
- SZCZYRBA, Z. (2006): Geografie obchodu – se zaměřením na současné trendy v maloobchodě. Přírodovědecká Fakulta UP Olomouc. p. 90, ISBN 80-244-1453-8.
- TOLMÁČI, L., LAUKO, V., KRIŽAN, F. (2005): Development of the network of super and hypermarkets in Slovakia after 1990 and its accessibility. In: Sammelband (Hsg. Zsilincsar): Neue Einzelandelstrukturen am Rande von Kleinstädten, Tagung Forschungssechseck Hartberg 15. – 16. 10. 2004. Institut für Geographie und Raumforschung Karl-Franzens-Universität Graz. p. 29 - 44, ISBN 3-901236-02-3.
- WALMSLEY, D. J., LEWIS, G. J. (1984): Human geography: Behavioural approaches. Logman Group, London. p. 303.

HUFFOV MODEL PRAVDEPODOBNOSTI A JEHO APLIKÁCIA PRE VYBRANÉ VEĽKOPLOŠNÉ PREDAJNE V KOŠICIACH

Zhrnutie

Mesto Košice je rozčlenené na 22 mestských častí a každá z nich predstavuje parameter i , teda parameter lokality odkiaľ sa meria vzdialenosť do predmetnej predajne (a pri parametri T_{ij} bola časová dostupnosť nahradená vzdialenosťou). Vo výpočtoch boli použité priemerné vzdialenosti k vybranej veľkoplošnej predajni z každej mestskej časti Košíc ($(\text{maximálna vzdialenosť} + \text{minimálna vzdialenosť})/2$).

Podľa Huffovho modelu najväčšiu pravdepodobnosť, že stredisko Optima bude vybrané ako cieľ nákupu má mestská časť Luník IX a mestské časti Pereš a Lorinčík. Je to spôsobené jednak blízkosťou týchto mestských častí k obchodnému centru Optima a tiež

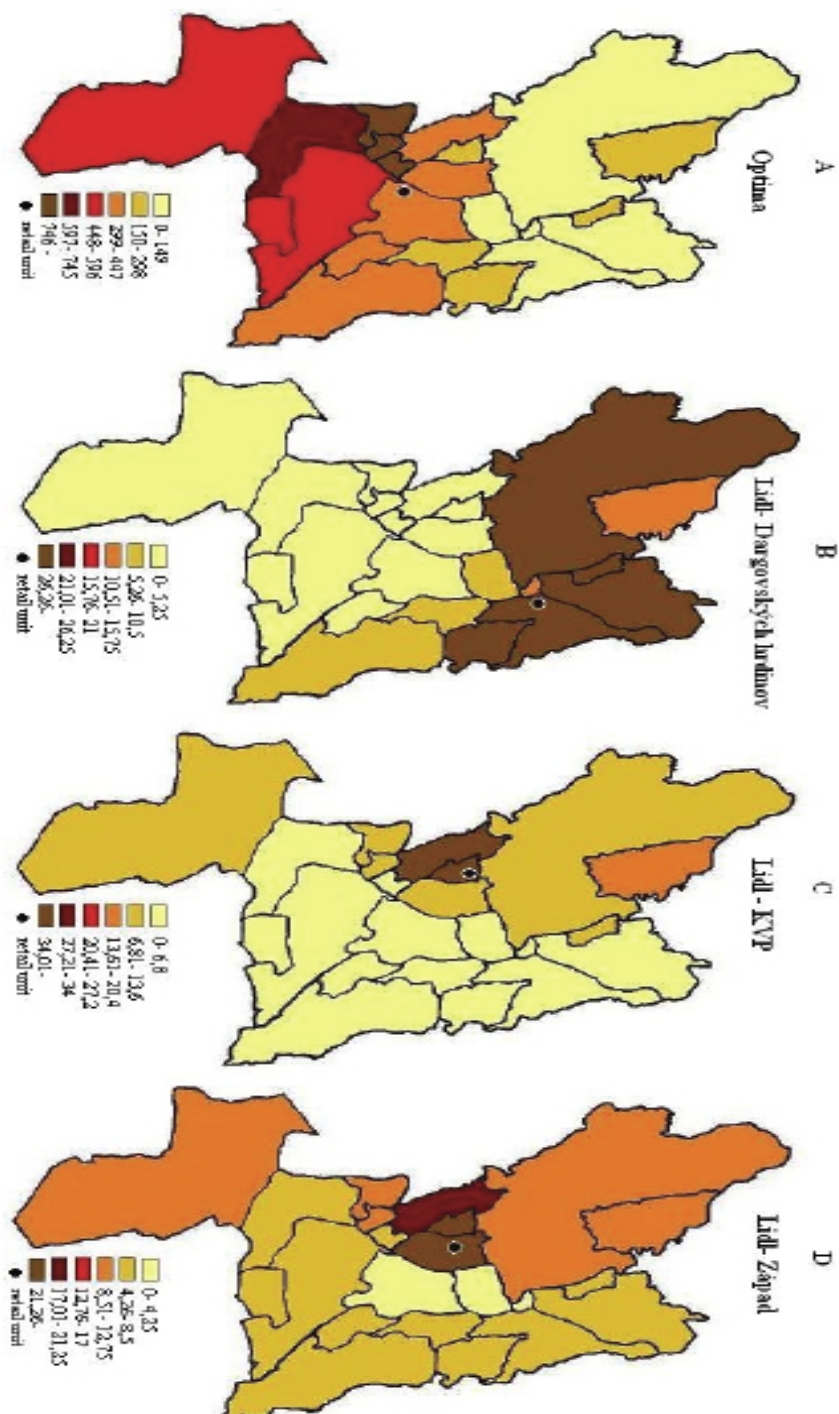
d ďalším významným faktorom je aj to, že v menovaných mestských častiach sa nenachádza žiadna iná predajňa zahrnutá do výskumu. V tomto prípade môžeme badať nedostatky tohto teoretického modelu, pretože nezohľadňuje niektoré faktory, ktoré na samotný výsledok vplývajú. V prípade mestskej časti Luník IX je to sociálna skladba obyvateľstva. Títo obyvatelia oveľa častejšie navštevujú za účelom nákupu iné veľkopredajne, ktoré ponúkajú cenovo výhodnejší no užší sortiment tovaru (napr. Kaufland, či Lidl). Pozoruhodné je to, že mestská časť v ktorej sa Optima nachádza nedosiahla najvyššiu hodnotu výpočtov pravdepodobnosti podľa Huffovho modelu, čo je spôsobené lokalizáciou iných predajní v tejto mestskej časti. Mestská časť JUH v ktorej sa Optima nachádza, je mestskou časťou s najväčším počtom veľkoplošných predajní v meste Košice a preto pravdepodobnosť nákupu nie je až tak vysoká, ako v mestských častiach Luník IX, Pereš a Lorinčík, kde sa nenachádzajú žiadne zo sledovaných predajní. Pozoruhodným bol taktiež výsledok najnižšej pravdepodobnosti nákupu v obchodnom centre Optima. Najnižšiu pravdepodobnosť nedosiahli najvzdialenejšie mestské časti, ale mestská časť Džungľa. Tento výsledok ovplyvnila najmä lokalizácia dvoch pomerne veľkoplošných predajní na území tejto mestskej časti (hypermarket Tesco a Baumax) a taktiež aj fakt, že Optima patrí ku najvzdialenejším predajniam od tejto mestskej časti. Podobné výsledky pravdepodobnosti pre mestskú časť Džungľa boli vypočítané aj pri meraniach pre predajňu Lidl, ktorá sa nachádza v mestskej časti Dargovských hrdinov. Aj keď je v tesnej blízkosti tejto predajne, tak pravdepodobnosť nákupu je oveľa menšia ako v susedných mestských častiach. To je spôsobené lokalizáciou veľkoplošných predajní v tejto najmenšej mestskej časti Džungľa. Podľa očakávaní najväčšia pravdepodobnosť nákupu podľa Huffovho modelu je v mestskej časti Dargovských hrdinov, kde sa daná predajňa aj nachádza. Najmenšia pravdepodobnosť nákupu nie je v najvzdialenejšej mestskej časti, ale v mestskej časti Luník IX. To je spôsobené blízkosťou iných väčších predajní (v mestskej časti JUH). Pri predajniach Lidl na sídlisku KVP a Západ najmenšiu pravdepodobnosť nákupu opäť zaznamenávame v mestskej časti Džungľa a to z už zistených dôvodov, ktoré sa objavili aj pri výpočtoch Huffovho modelu pre obchodné centrum Optima. V ostatných výpočtoch nenastali žiadne neočakávané výsledky. Všetky výpočty sa premietli do máp, ktoré sú znázornené na Obrázku 1. Na ňom si môžeme všimnúť, že pravdepodobnosť nákupu so vzdialenosťou klesá pomalšie pri obchodnom centre Optima (obrázok 1A). Na rozdiel od toho na obrázkoch 1B, 1C, 1D si môžeme všimnúť, že pravdepodobnosť nákupu klesá rýchlejšie so vzdialenosťou. To je značne spôsobené aj veľkosťou predajní.

Huffov model podáva všeobecný, teoretický obraz pravdepodobnosti nákupu v danej predajni. Lenže pri jeho aplikovaní do praxe musíme počítať aj faktormi, ktoré túto teoretickú koncepciu ovplyvňujú, a to napr. sociálne, kultúrne, demografické i ekonomické aspekty, dostupnosť do predajní a mnoho iných. Tie však nie je možné zakomponovať do žiadneho modelu, pretože každé prostredie je špecifické a neplatia tu úplne presne všeobecné predpoklady a zistenia. Preto výsledky dotazníkového prieskumu realizovaného v súčasnosti budú použité na porovnanie výsledkov pri výpočtoch Huffovho modelu pravdepodobnosti nakupovania vo vybraných predajniach danej mestskej časti Košíc so skutočnosťou zistenou výskumom.

Recenzovali: Prof. RNDr. René Matlovič, PhD.

Doc. RNDr. Zdeněk Szczyrba, PhD.

Picture 1:



Picture 2:

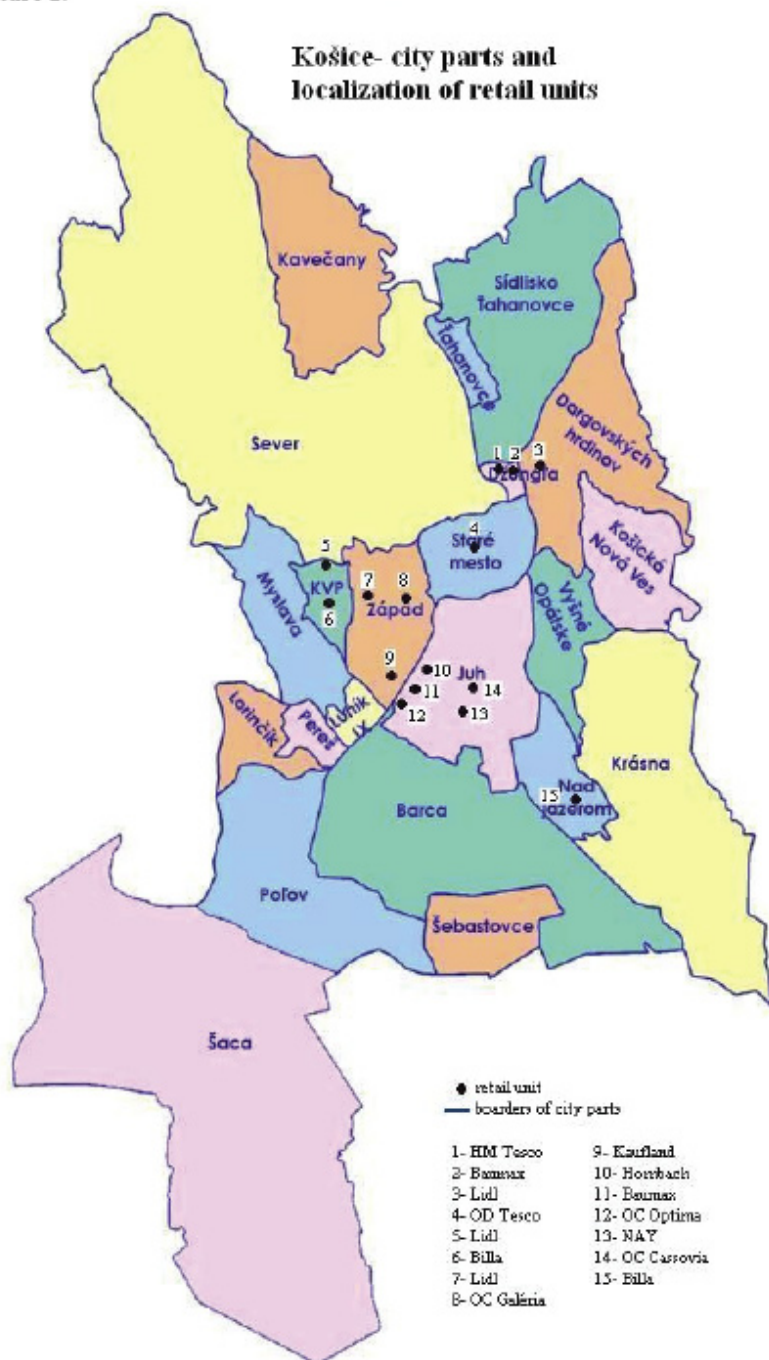


Table 1a: Application of the model to selected large-area retail units

City part	$\sum_{j=1}^n \left[\frac{S_{ij}}{T_{ij}\lambda} \right]$ without OPTIMA a LIDL	$\frac{S_{ij}}{T_{ij}\lambda}$ (OPTIMA)	$\frac{S_{ij}}{T_{ij}\lambda}$ (LIDL Darg. hrd)	$\frac{S_{ij}}{T_{ij}\lambda}$ (LIDL KVP)	$\frac{S_{ij}}{T_{ij}\lambda}$ (LIDL Západ)
Staré mesto	33530.33	2250	248.2	98.93	145.18
Barca	3109.72	1777.78	20.57	23.11	30.72
Dargovských hrdinov	4124.91	599.38	203.18	24.73	26.34
Džungľa	98293.39	1306.12	1400	64.2	75
Kavečany	1465.38	369.17	27.58	29.62	20.64
Košice- JUH	22450.96	9000	77.51	64.2	113.61
Košice – SEVER	9465.56	1306.12	155.56	144.44	105.35
Košice – ZÁPAD	30332.51	10240	65.45	369.78	1200
Košická Nová Ves	4713.1	959.6	185.12	23.9	30.72
Krásna	1792.83	661.88	22.58	13.33	15.67
KVP	13507.02	4355.39	46.28	1697.96	634.71
Lorinčík	3986.78	3160.49	17.28	71.97	70.52
Luník IX	18579.76	36000	30.73	133.12	237.04
MČ KE- Sídliisko Ťahanovce	3305.34	483.93	122.91	26.53	24.49
Myslava	5750.9	2739.6	28.57	369.78	158.68
Nad Jazerom	5500.93	2250	35.84	25.61	34.77
Pereš	7170.01	7111.11	22.58	106.12	122.88
Poľov	2880.42	2115.7	14	30.77	37.93
Šaca	829.34	457.05	6.33	12.68	11.42
Šebastovce	2404.64	1370.61	14.73	19.1	23.64
Ťahanovce	2743.58	457.05	93.24	25.61	23.64
Vyšné Opátske	9504.36	2115.7	99.56	37.66	53.19

Source: authors

Table 1b: Application of the model to selected large-area retail units

City part	$\sum_{j=1}^n \left[\frac{s}{T_{ij}\lambda} \right]$ without OPTIMA	$\sum_{j=1}^n \left[\frac{s}{T_{ij}\lambda} \right]$ without LIDL Darg. hrd.	$\sum_{j=1}^n \left[\frac{s}{T_{ij}\lambda} \right]$ without LIDL KVP	$\sum_{j=1}^n \left[\frac{s}{T_{ij}\lambda} \right]$ without LIDL Západ	$P(C_{ij})$ OPTIMA	$P(C_{ij})$ LIDL Darg. hrdinov	$P(C_{ij})$ LIDL KVP
Staré mesto	34022.64	36024.44	36173.71	36127.46	0.066132434	0.006889767	0.002734859
Barca	3184.12	4941.33	4938.79	4931.18	0.558326947	0.004162847	0.004679284
Dargovských hrdinov	4379.16	4775.36	4953.81	4952.2	0.136870998	0.042547578	0.004992117
Džungľa	99832.59	99738.71	101074.51	101063.71	0.013083102	0.014036676	0.000635175
Kavečany	1543.22	1884.81	1882.77	1891.75	0.239220591	0.014632775	0.015732139
Košice- JUH	22706.28	31628.77	31642.08	31592.67	0.396366115	0.002450617	0.002028944
Košice – SEVER	9870.91	11021.47	11032.59	11071.68	0.13232012	0.01411427	0.013092121
Košice – ZÁPAD	31967.74	42142.29	41837.96	41007.74	0.320322926	0.001553072	0.008838385
Košická Nová Ves	4952.84	5727.32	5888.54	5881.72	0.193747426	0.032322273	0.004058731
Krásna	1844.41	2483.71	2492.96	2490.62	0.358857304	0.009091239	0.005347057
KVP	15885.97	20195.08	18543.4	19606.65	0.274165821	0.002291647	0.091566811
Lorinčík	4146.55	7289.76	7235.07	7236.52	0.762197489	0.002370448	0.009947381
Luník IX	18980.65	54949.92	54847.53	54743.61	1.896668449	0.000559236	0.002427092
MČ KE- Sídliisko Ťahanovce	3479.27	3840.29	3936.67	3938.71	0.139089522	0.032005395	0.006739198
Myslava	6307.93	9018.96	8677.75	8888.85	0.434310463	0.003167771	0.042612428
Nad Jazerom	5597.15	7811.31	7821.54	7812.38	0.401990299	0.004588219	0.003274291
Pereš	7421.59	14510.12	14426.58	14409.82	0.958165299	0.001556155	0.007355867
Pol'ov	2963.12	5064.82	5048.05	5040.89	0.714010907	0.002764165	0.006095423
Šaca	859.77	1310.49	1304.14	1305.4	0.531595659	0.004830254	0.009722883
Sebastovce	2462.11	3817.99	3813.62	3809.08	0.556681058	0.003858051	0.005008365
Ťahanovce	2886.07	3249.88	3317.51	3319.48	0.158364142	0.02869029	0.007719645
Ľysné Opátske	9694.77	11710.91	11772.81	11757.28	0.218231067	0.008501474	0.003198896

Source: authors

Table 1c: Application of the model to selected large-area retail units

City part	$P(C_{ij})$ LIDL Západ	$P(C_{ij}) \cdot 1000$ OPTIMA	$P(C_{ij}) \cdot 1000$ LIDL Darg. hrd.	$P(C_{ij}) \cdot 1000$ LIDL KVP	$P(C_{ij}) \cdot 1000$ LIDL Západ
Staré mesto	0.00401855	66.13243417	6.889767058	2.734859101	4.018549879
Barca	0.006229746	558.3269475	4.162846845	4.679283792	6.229746227
Dargovských hrdinov	0.005318848	136.8709981	42.54757756	4.992117178	5.318848189
Džungľa	0.000742106	13.08310242	14.03667643	0.635174981	0.742106143
Kavečany	0.010910533	239.2205907	14.63277466	15.73213935	10.91053258
Košice- JUH	0.003596087	396.3661155	2.450616954	2.028943736	3.59608732
Košice – SEVER	0.009515268	132.3201204	14.11426969	13.09212071	9.515267782
Košice – ZÁPAD	0.029262768	320.3229255	1.553071748	8.838385046	29.26276844
Košická Nová Ves	0.005222962	193.7474257	32.3222729	4.058731027	5.222961991
Krásna	0.006291606	358.857304	9.09123851	5.347057313	6.291606106
KVP	0.03237218	274.1658205	2.291647273	91.56681083	32.37217985
Lorinčík	0.009745016	762.1974895	2.37044841	9.947381297	9.74501556
Luník IX	0.004330003	1896.668449	0.559236483	2.427091977	4.330003082
MČ KE- Sídliisko Ťahanovce	0.006217772	139.0895217	32.00539543	6.739198358	6.217771809
Myslava	0.017851578	434.3104632	3.167771007	42.61242834	17.8515781
Nad Jazerom	0.004450628	401.9902986	4.588218877	3.274291252	4.450628362
Pereš	0.008527518	958.1652988	1.55615529	7.35586674	8.52751804
Poľov	0.007524465	714.0109074	2.76416536	6.095422985	7.524464926
Šaca	0.008748276	531.5956593	4.830254332	9.722882513	8.74827639
Šebastovce	0.006206223	556.6810581	3.858050964	5.008364756	6.206223025
Ťahanovce	0.007121597	158.3641422	28.6902901	7.719645156	7.121597359
Vyšné Opátske	0.004524006	218.2310669	8.501474266	3.19889644	4.524005552

Source: authors

POSSIBILITIES OF APPLICATION OF MARKETING INSTRUMENTS IN PLACE MARKETING AREA

Magdalena FLOREK¹

Abstract: *The paper discusses the structure of place marketing tools. Arguing that the classic marketing mix is insufficient in the case of place marketing, the proposal of new marketing set for places presented. It encompasses co-called megaproduct (within which price and distribution should be included), promotion, partnership, and identity of a place. The last one, perspective tool, is especially important and its significance comes from the importance of place image. It is also suggested that identity should be treated as superior and coordinative instrument in place marketing mix.*

Key words: *place marketing, place marketing mix, place identity, megaproduct, partnership*

INTRODUCTION

Marketing in its instrumental aspect is defined as a set of tools that can be used to influence the market. It reflects the practical and actual possibilities of application of marketing concept in achieving goals by different types of entities. Thus, the adequate selection of marketing instruments determines the final effect and completes the whole marketing process.

Marketing mix is not a merely collection of instruments but internally integrated structure and only its optimal composition decides on possibilities of achievement of goals set compared to costs assumed.

Marketing instruments are often called 'variables' meaning they can be changed, adjusted, modified, and controlled (Canada 1997, p.44). In the classic approach, the set of marketing mix consists of 4 tools: product, price, place and promotion. These instruments can be also applied to place marketing just like to other emerging areas of implementation of marketing concept. And similarly as in the case of constant expansion of marketing to new areas, the classic marketing instruments can be enriched with new adequate place marketing tools.

THE STRUCTURE OF PLACE MARKETING MIX – LITERATURE REVIEW

In the case of place marketing there are justified claims being made that the classic marketing instruments are insufficient and their application to places presents a lot of limitations. This critique is connected with the specifics of place product and with many barriers in using price and distribution in place marketing. Furthermore, additional, more relevant tools might be added to the initial set.

The most common approach to marketing mix adapted to territories is the mechanical adoption of the traditional tools of marketing and/or enriching it with the fifth element called "people".

1 *Dr. Magdalena Florek,*

The Poznań University of Economics, e-mail: m.florek@ae.poznan.pl

This tool is defined in two contexts (Metaxas 2002):

- as a process of management of human resources related to attracting, organizing, training, motivating, and rewarding people indispensable in an organization, so they can help with satisfying the needs of customers; and
- as the input of residents into place development.

Similar aspects are the subject of approach known as 'economic development marketing', popular in the American literature. In this case, the additional element 'people' is in a sense a connection and a way of coordinating of other elements (Canada 1997).

Another approach is based on an attempt to include residents in the process of place marketing. This method uses the concept of marketing mix consisting of seven Ps and it differentiates: producer – the sender of a message; reference groups – residents; product – plan of spatial development which is the subject of evaluation by society or by consulting process; price; promotion; distribution and finally control methods (Girard 1997).

Human factor is also raised by some authors who differentiate local officials and local political system as a marketing tool (e.g. Markowski 1990). Yet, officials construct only one aspect of a place – the sphere of contacts between administration and customers. In turn, the changes of political scene or existing political lobby cannot be treated as an instrument of marketing because it is impossible to design or modify those variables. They are out of control and form rather the determinants for implementation of marketing to places.

When searching for the new instruments in operational aspect of place marketing, marketing mix that consists of another seven elements can be also found (Kilingbeck and Trueman 2002). Apart from the traditional tools, it includes people - meaning employment, training and motivating the best and the most suitable people who supply products and services of a place (this term also covers residents who should possess skills that support the image of a place). Next instrument is physical evidence – meaning the use of visual aspects that represent the image that place wants to communicate. Finally, there is process management – reassuring that users of products and services of a place are treated in a way which is coherent with the image of that place.

Other opinions result in distinction of so-called geographical marketing mix (Kavaratzis 1990) which was selected for city marketing. According to this concept, marketing mix can be defined as the combination of promotional, spatial-functional, organizational, and financial instruments. The scope and efficiency of city marketing is determined by the selection and application of proper combination of those variables.

Interesting approaches are those coming from the attempts to describe variables used currently in cities. The first one (Hubbard and Hall 1998) includes elements such as: advertising and promotion, visual modernization, public arts, 'mega-events', cultural renaissance, and public-private partnership. The second approach (Griffiths 1998) suggests that marketing instruments can be used in three major strategies: promotional strategies - publicity and advertising, event-based strategies – festivals and events, and landscape strategies – land development and place marketing.

One more concept (Kotler et al. 1993) includes following tools: infrastructure and services, attractions, character (image and quality of life), people (residents, leaders, etc.) and it also draws attention to necessity of including the human factor and immaterial values of a place.

Based on the above discussion, it can be observed that definition of relevant mix of instruments in place marketing is still the subject of search. Because of growing popularity of place marketing it is necessary to precisely define and establish the character of those instruments as well as to define their scope and to prioritize the importance of particular tools. This will allow to find their optimal combination from the point of view of a particular place.

PECULIARITIES OF TRADITIONAL MARKETING MIX INSTRUMENTS IN PLACE MARKETING

In the case of places, the classic set of four Ps presents limited application possibilities due to peculiarities of place product, price, distribution and promotion.

Place product is connected with consumers' needs and wants in an opposite way as it is in the case of typical commercial goods. In marketing terms a product is an answer to the needs and preferences of consumers, created from the very beginning according to buyers' wants and developed due to their changing desires. Place product is something that already exists, the heritage of past generations. Therefore, this is the place product that selects potential markets in the context of needs it could satisfy. In place marketing there are not many possibilities to change the destination in order to meet particular customers' needs. It is, to a great extent, primary to buyers' wants.

Place product is often called 'megaproduct' (Markowski 1997) since it can be described as a combination of material and immaterial products (subproducts) that are mutually connected. One criteria for de-composing of megaproduct is by the functions that product performs (Szromnik 1997), thus it is possible to separate: tourist product, investment product, residential product, social, trade and service, cultural and educational product, fairs and exhibitions, recreation and sport, and public product. In the case of a bigger, complex destination, it is important to distinguish the spatial criterion in addition. As a result, when considering complex spaces, the megaproduct is an assemblage of smaller units which influence the final, superior product with different intensity. In this context, it is possible to single out such subproducts like: communes, districts, cities, towns, villages, etc.

Leaving the discussion about details of megaproduct (as it is a frequent subject study in literature) and its components (the so-called subproducts), one can point out the following features underlining the specifics of place product (Florek 2006):

- intangibility of magaproduct as a whole, although one can point out its subproducts at different material and intangible levels;
- no possibility of direct (simultaneous) comparison of the product both in time aspect (the same place product several times) and space aspect (similar products in different parts of the territory);
- megaproduct as a whole cannot be moved, it is inseparable from the region it exists in;
- variety (it offers services as well as immaterial and classic material goods);
- varied durability of subproducts within the constant, complex megaproduct;
- very high level of complementarity (e.g. services that constitute tourist product).

The above features do not exclude the possibility of modification or even planning and designing place products (or, more frequently, its components). However, they form certain limitations in the process of shaping a place product.

In place marketing, distribution consists of all activities connected with covering time and space differences related to creation of place product, its sales and consumption (Kornak and Rapacz 2001). Distribution in place marketing has a special character because the majority of place subproducts are available in the location they exist or are produced in. Thus, potential customers of these subproducts have to move to buy or consume them. As a consequence, the object of flow through the distribution channel are exceptionally the buyers, not the products.

In the case of place marketing, distribution is mostly connected with internal availability (spatial planning and efficiency of communication systems) as well as external (transport and telecommunication systems). Distribution in this aspect has a great importance since the purchase of the place offer takes place at a significant distance from the place of its consumption. However, the understanding of distribution in the aspect of localization is not enough and from this point of view, it is not the location of a place in space, but its availability that might provide the source of its competitive advantage. At the same time the acceleration of the transportation and travel processes will create stronger competition between places being outside its boundaries before.

This is why in distribution channels, apart from the traditional flows (product – if customers purchase products in a place, financial – connected with the payment for place subproducts, ownership – the possibility of using certain types of subproducts, and negotiation – connected with the conditions of making the place offer available), information flows are especially important as they influence the availability of place offer.

Interpretation of price in place marketing is especially complex. Even if one treats a place as a set of physical objects, in fact it cannot really be sold, often because it is impossible to make use of all the elements that a place consist of. It is possible to sell certain facilities, grounds, ownerships, services, etc., but still these decisions are determined by many internal and external factors and decision making centers' responsibilities. Problems arise also because of the specific character of a place (the effect of cooperation of private and public sectors) which, as a whole, is a peculiar 'property' of the general public and cannot be subjected to typical financial transactions. At the same time prices of particular subproducts result also from price policies of particular companies located in a place that offer their goods and services to customers. Thus, it is difficult to talk about a uniform place price policy or strategy. Prices of goods in a particular place are based on very complex issues such as political aims, social goals, preferences of local governments and local companies which form its supply structure. The specific feature of place product lies also in the fact that one destination can be 'sold' in many ways, each time to a different customer or even to the same customer. This is possible because it is a living entity, always in the process of creation and change (Czornik 1998).

In the case of promotion, widely described in the literature, its usage is probably the most similar to traditional character and its techniques are directly transferred to promote a place as a product.

TOWARDS NEW STRUCTURE OF PLACE MARKETING MIX

To sum up the above discussion, there are some possibilities of implementation classic marketing tools to places, however there are many barriers in their direct transfer and mutual relations that need to be discussed. Especially price and distribution in place marketing are strictly connected to place megaproduct (e.g. location of a place or cost of labor force) and they form its features and perception. What can be observed is the disappearance of differences between product, price, and distribution being interpreted as components of a place offer. This problem was also raised by Middleton (1996), who considers price as a component of tourist product, and Becker (1998) who mentions that in practice the number of marketing tools is usually reduced to three: product, distribution, and communication. As a justification for avoidance of price, Becker considers it as strictly related to product characteristics and that in business reality price decisions are taken in relation price-quality. It can be assumed thus, that it is reasonable to treat price and distribution as the components of megaproduct.

One must also note the importance of human factor, often discussed in the literature, which comes from the practice of place marketing. The success of different kind of processes in a place is possible only with adequate coordination and cooperation between entities involved. It is hard, however, to agree with the proposals of selecting residents or people in general as a marketing instrument. In order to use human resources as a tool, they must be treated as a variable that can be controlled and regulated. This is why a more efficient solution is to define this variable in the category of partnership. The importance of partnership plays a key role in application of place marketing, yet it might be called into question if partnership is going to be understood as kind of relations, feature of connections or mutual relations. In this context partnership can be also treated as a result of marketing actions. On the other hand, partnership might become the subject of intentional activities as a method of cooperation of entities within a place. They are able to use rules, norms and organizational structures to take decisions and actions related to marketing. If by partnership one can understand all forms of connections of entities in a place, not only the cooperation between public and private sectors, but also the involvement of residents and local government representatives, and if it is possible to manage this process, there is a basis for including partnership in place marketing mix set. Such an embrace of partnership is more precise than 'people' and could form, apart from megaproduct and promotion, the third tool of place marketing.

In searching for new concepts of marketing mix for places, one must stress the growing importance of image which represents immaterial and intangible features of destination. Place image, often referred to brand, is a marker that differentiates the place from others and can be the source of competitive advantage. It is also a kind of 'generalization' and 'simplification' of the complex and diversified place product. The image of a place can be defined as the sum of beliefs, ideas, opinions, feelings and emotions the recipients have about it. It represents the simplification of many associations and information related to a place (Kotler et al., 1993). Objective information is replaced by subjective observations, opinions and judgments (Żymkowski 1997) which are related mostly to the features of customers themselves, their subjective perception (evaluation) of a place and relations (contacts and mutual experiences) between customers (Hartmann 1992).

Taking into consideration the real influence on creating, modification or changing the existing image, which is a specific marketing effect, it must be stated that it can be done by using place identity concept. Place identity, similarly to corporate identity, is defined as the sum of its characteristic features and activities which differentiate it from other entities (Klage 1991; Florek et al. 2006). Place identity² is therefore the subject of planning and intentional arranging of activities within a place. Image, in turn, is the reflection of this identity, the reaction to communicating this message in the minds of the recipients. This way identity is an objective while image is a subjective state.

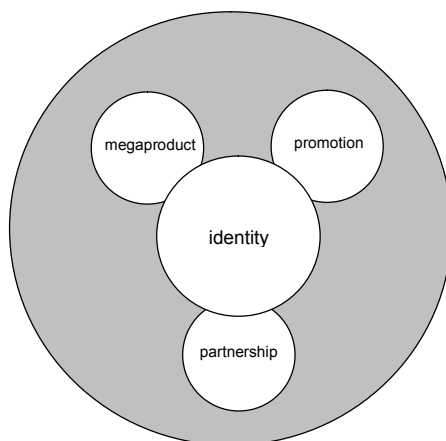
The elements of identity that places (usually decision-makers in territorial units) can use to build it are: place behavior (actions taken mostly by authorities and residents) observed by external society, place design – the way of visual presentation and identification of a destination and place communication – the form of communication of a place with its environment.

Despite the proper process of image creation, the perception of a place is not a direct result of activities that create the image since image is influenced by ideas, expectations and emotions of audiences (Klage 1991). Thus, this is identity rather than meets the requirements of marketing tool: it can be designed, modified, adjusted, and controlled and itself is a unique set of tools that results in an image. It is suggested therefore that place identity could be included to place marketing mix. At the same some relations and interconnections exist between already chosen tools (megaproduct, partnership, promotion) and identity since identity uses the same elements within them. For example one of areas of identity influence is behaviour and actions taken by authorities and residents that, at the same time, are related to shaping place offer (megaproduct) and actions of place actors (partnership). Also, visual identification is connected to megaproduct character and promotion actions. These, merely signalized, relations shows that it is impossible to clearly separate the tools analyzed. Additionally, identity can influence and coordinate the remaining tools which increases the effectiveness of marketing mix. On the one hand, identity units and coordinates the use of other elements, and on the other hand, each of them reinforces the application of identity. Identity also performs the integrative role and prevents the internal incohesion within marketing mix structure.

Identity could therefore be treated as a superior instrument of place marketing mix, regardless of the size and characteristics of a place. While the remaining place marketing tools can be easily copied by competitive places, identity, and consequently image, is the result of complicated and long-term activities. The final result of these actions is the uniqueness of a place and this is why, in the structure of place marketing instruments, it should have a leading role.

Place marketing, in its instrumental aspect, might thus consist of four tools: megaproduct, promotion, partnership, and identity, giving the latter the prominent role (figure 1).

2 Commonly identity is understood as a set of features and behaviors of residents of a place. It is, however, sociological aspect of this problem which is too narrow for the needs of place marketing. Additionally the term 'place identity' was accepted as the analogy to corporate identity in which such aspect is not taken into consideration.

Fig. 1: *Composition of place marketing instruments*

Source: author

Despite the fact that identity was selected as the superior instrument, it does not mean that other instruments below identity should be treated with equal level of importance. The structure of other instruments according to importance (level of participation) in the process of achieving place goals can differ depends on the structure and influence of internal resources and external forces. It is also determined by characteristics and goals within targeted segments of customers. The final composition of marketing mix tools depends also on the level of co-dependence between particular instruments and the level of their interchangeability and complementarily in a particular place. The objective of every designed structure of marketing mix for a destination should be to obtain maximum possible effects in the process of realization of objectives.

References

- BECKER, J. (1998): *Marketingkonzeption: Grundlagen des strategischen und operativen Marketing-managements*, Gabler Verlag, Munchen.
- CANADA, E.P. (1997): 'AsharkProof Marketing Plan', *Economic Development Review*, Spring.
- CZORNIK, M. (1998): 'Promocja miasta', Akademia Ekonomiczna, Katowice.
- FLOREK, M. (2006): 'Podstawy marketingu terytorialnego', Wydawnictwo Akademii Ekonomicznej w Poznaniu.
- FLOREK, M., INSCH, A., GNOTH, J. (2006): City Council websites as a means of place brand identity communication, *Place Branding*, Vol.2, Issue 4.
- GIRARD, V. (1997): 'Marketing terytorialny i planowanie strategiczne', in 'Marketing terytorialny - strategiczne wyzwania dla miast i regionów', pod red. T. Domańskiego, Uniwersytet Łódzki, Łódź.
- GRIFFITHS, R. (1998): 'Making Sameness: Place Marketing and the New Urban Entrepreneurialism' in: Oathley, N. (1998): 'Cities Economic Competition and Urban Policy', Paul Chapman Publishing Ltd, London.
- HARTMANN, R. (1992): 'Strategische marketingplanung im Einzelhandel', Deutscher Universitätsverlag, Wiesbaden.

- HUBBARD, P., HALL, T. (1998): 'The Entrepreneurial City and the New Urban Politics', in: Hubbard P., Hall T., 'The Entrepreneurial City: Geographies of Politics, Regime and Representation', John Wiley&Sons Ltd, Chichester.
- KAVARATZIS, M. (1990): 'City Brands: The Why and How of City Branding', article prepared for ERSA 2004 Congress, after: Ashworth G.J., Voogd H., 'Selling the City: Marketing Approaches in Public Sector Urban Planning', Belhaven Press, London.
- KILLINGBECK, A. J., TRUEMAN, M. M. (2002): 'Redrawing the Perceptual Map of a City Bradford University', School of Management.
- KLAGE, J.P. (1991): 'Corporate identify im Kreditwesen', Deutscher Universität Verlag, Wiesbaden.
- KORNAK, A.S., RAPACZ, A. (2001): 'Zarządzanie turystyką i jej podmiotami w miejscowości i regionie', Akademia Ekonomiczna, Wrocław.
- KOTLER, P., HAIDER, D. H., REIN, I. (1993): 'Marketing Places-Attracting Investment, Industry, and Tourism to Cities, States, and Nations', The Free Press, New York.
- MARKOWSKI T. (1997): 'Miasto jako produkt - wybrane aspekty marketingu miasta', in 'Marketing terytorialny - strategiczne wyzwania dla miast i regionów', pod red. T. Domańskiego, Uniwersytet Łódzki, Łódź.
- MARKOWSKI T. (1999): 'Zarządzanie rozwojem miast', PWN, Warszawa.
- METAXAS, T. (2002): 'Place marketing as a tool for local economic development and city's competitiveness: a comparative evaluation of place marketing policies in European cities', conference materials, EURA Conference Urban and Spatial European Policies: Level of Territorial Government, Turin, 18-20.04.2002.
- MIDDLETON V.T.C. (1996): 'Marketing w turystyce', Polska Agencja Promocji Turystyki, Warszawa 1996.
- SZROMNIK, A. (1997): 'Marketing terytorialny - geneza, rynki docelowe i pomioty oddziaływania', in 'Marketing terytorialny - strategiczne wyzwania dla miast i regionów', pod red. T.Domańskiego, Uniwersytet Łódzki, Łódź.
- ŻYMINKOWSKI, T. (1997): 'Metody badania wizerunku banku in 'Instrumenty marketingu i ich zastosowania', pod red. H.Szulce, Zeszyty Naukowe – seria I, nr 242, Wydawnictwo Akademii Ekonomicznej w Poznaniu.

MOŻLIWOŚCI APLIKACJI NARZĘDZI MARKETINGOWYCH W MARKETINGU TERYTORIALNYM

Streszczenie

W artykule omówiono możliwości aplikacji narzędzi marketingu do specyfiki marketingu terytorialnego. Przyjmując, iż klasyczna koncepcja marketingu mix jest niewystarczająca w przypadku terytoriów, zaproponowano nową mieszankę instrumentów marketingowych. Obejmuje ona tzw. megaprodukt (a w jego obrębie cenę i dystrybucję), promocję, partnerstwo i tożsamość. Ta ostatnia potraktowana została jako narzędzie nadrzędne, pełniące funkcję koordynacyjną w ramach zaproponowanej struktury terytorialnego marketingu mix.

Recenzowali: Prof. RNDr. René Matlovič, PhD.
Prof. RNDr. Robert Ištók, PhD.

SPATIALLY DISTRIBUTED ASSESSMENT OF SOLAR RESOURCES FOR ENERGY APPLICATIONS IN SLOVAKIA

Jaroslav HOFIERKA¹, Tomáš CEBECAUER²

Abstract: *Spatial and temporal distribution of available solar energy depends on several factors. Besides latitude and astronomical factors it is strongly influenced by climate factors (e.g. cloudiness, turbidity) and topography. This paper presents a solar database of Slovakia containing spatially-distributed solar energy resource data necessary for planning, siting and forecasting of solar device installations. The database consists of several data sets showing monthly and annual real-sky and clear-sky irradiation on horizontal and optimally-inclined planes. It was derived from available solar radiation databases, ground-station meteorological data, digital elevation model with a horizontal resolution of 100 m and methodology based on the r.sun solar radiation model. The analysis and modeling was performed within the open-source environment of GRASS GIS. The results show that an average daily sum of real-sky solar irradiation on a horizontal plane is about 3.0 kWh/m²/day (ranging from 2.7 to 3.3 kWh/m²/day for 95% of the area) with the highest potential in southern areas of the Slovak territory. Northern, mountainous areas have a mixed potential that strongly depends on local topography (areas affected by shadows). The energy yield can be increased by optimization of solar panel inclination. The solar panel inclined to 34 - 46 degrees receive about 2.9-3.8 kWh/m²/day of solar irradiation (95% of the area) with the average value of 3.3 kWh/m²/day. The study showed a strong seasonal variation of available solar energy with the highest values during summer months. Horizontal planes in December, in average, receive only 15% of solar irradiation available in June. The optimization of solar panel inclination increases the availability of solar energy during winter up to 30% of June values.*

Key words: solar radiation, irradiation, renewable energy, geographic information system, Slovakia

INTRODUCTION

Solar energy is one of renewable energies (RE) with a rapidly growing importance. In these times, this fact is even more boosted by environmental costs and limited supply of fossil fuels, progress in solar technology with an increasing efficiency of solar energy conversion (Jäger-Waldau, 2005). Solar energy is currently used in a number of

1 **Doc. Mgr. Jaroslav Hofierka, PhD.,**

Department of Geography and Regional Development, Faculty of Humanities and Natural Sciences, University of Prešov, 17. novembra 1, 081 16 Prešov, Slovak Republic, e-mail: hofierka@fhpv.unipo.sk

2 **Mgr. Tomáš Cebecauer, PhD.,**

European Commission - DG Joint Research Centre, Institute for Environment and Sustainability, Renewable Energies Unit, Via E. Fermi, TP 450, I-21020 Ispra (VA), Italy; Institute of Geography, Slovak Academy of Sciences, Štefánikova 49, 814 73 Bratislava, Slovak Republic, e-mail: tomas.cebecauer@jrc.it

applications that can be grouped in three major areas: heat production (hot water, building heat, cooking), electricity production (photovoltaics) and desalination of seawater.

While the amount of solar radiation on the Earth's upper atmosphere is almost constant (1366 W/m^2), the availability of solar irradiation on the Earth's surface is greatly spatially and temporally variable. The key factor is latitude with the greatest available irradiation in tropics and the lowest values around the poles. The seasonal dynamics of irradiation is given by astronomic factors. The atmosphere absorbs and reflects large part of the radiation, so the irradiation in desert areas near tropics is about 7 to 9 kWh/m²/day.

The varying atmospheric conditions (clouds, dust, pollutants) further modify the availability of solar irradiation within years and even days. Atmospheric conditions not only reduce the quantity of insolation reaching the earth's surface but also affect the insolation quality by scattering and absorption of incoming light and altering its spectrum. While average insolation data offer an insight into solar energy potential on a regional scale, locally relevant conditions such as surrounding terrain may significantly influence the solar energy potential in a specific site.

Solar systems (photovoltaics, heating and cooling systems) are experiencing a rapid growth (Jäger-Waldau, 2005), and more detailed knowledge of the primary solar energy resource is needed. Clearly, the analysis of available solar energy resources is part of the efforts to integrate solar energy into energy systems in many countries. For example, Šúri et al. (2006) present a complex database of solar irradiation maps and other climatic parameters for Europe. New web-based tools were developed to provide an access to the database and make assessments of the photovoltaic systems performance (Šúri et al., 2005).

The improved knowledge can significantly contribute to a better siting and economic assessment of new installations and improve the performance monitoring and forecasting. It is also needed for a large-scale integration of solar energy systems into existing energy and economic structures. The geographical factors, spatial and temporal distribution of renewable energy resources impose questions that also require specific location-dependent answers in policy making. Therefore a map-based assessment of available solar resources greatly contributes to the effective policies to be set at the level of the European Union, its member states and regions (Šúri et al., 2006).

In Slovakia, several authors studied solar radiation and its components including methodology issues and factors affecting its spatial and temporal variability (e.g., Kitler and Mikler (1986), Hrvol' (1996), Hrvol' and Horecká (2000), Krcho (1990), Jenčo (1992), Hofierka (1997)). The spatial variability of global irradiation in the territory of Slovakia was analyzed by various methods. For example, Hrvol' and Tomlain (1992, 1997), Tomlain and Hrvol' (2002) published maps of global irradiation for horizontal and inclined planes developed using meteorological data containing monthly averages of cloudiness and relative sunshine duration from the time periods of 1951 - 1980 and 1961 - 1990. The maps of global irradiation were derived by manual interpolation. Šúri (2002) presents a 500-m database of global irradiation derived using the *r.sun* model, digital terrain model (DTM), meteorological data taken from the SODA website and data published by Tomlain and Hrvol' (1992). This database was further analyzed to assess the photovoltaic potential of urban areas in Slovakia (Šúri et al., 2002) and electricity yield potential for different types of photovoltaic system installations (Šúri, 2006).

To account for spatial variations of solar irradiation in different geographical conditions, solar radiation models integrated with geographical information systems (GIS) were developed. Solar radiation models use ground-based or satellite data and DTMs as inputs into physically-based and empirical equations to provide estimates of irradiation over large regions, while considering terrain inclination, orientation and potentially also shadowing effects. In our previous work (Šúri and Hofierka, 2004), we have analyzed GIS-based solar radiation models, such as *SolarFlux* (Dubayah and Rich, 1995, Hetrick et al., 1993), *Solei* (Mészároš, 1998), *Solar Analyst* (Fu and Rich, 2000) and *SRAD* (Wilson and Gallant, 2000). An analysis showed that these models have some restrictions in terms of their applicability in large regions and handling all necessary input parameters as spatially-distributed data. Hofierka (1997) has developed a clear-sky solar irradiation model *r.sun* implemented in an open-source environment of GRASS GIS. This model has been further improved by Šúri and Hofierka (2004) to include diffuse and reflected components of solar radiation for clear-sky and real-sky modeling. The model is sufficiently robust and flexible over various scales. Therefore we decided to use the *r.sun* model in the analysis of the solar energy resources in Slovakia.

The aim of this study is to assess solar energy resources in Slovakia at a regional scale represented by 100-m horizontal resolution of raster-based GIS data. The dynamics of solar energy resources is analyzed on a monthly basis. Local optimization of solar panel inclination is analyzed in order to maximize the potential annual energy yield. The regional analysis and implications for regional development and possible support schemes is based on NUTS-4 level represented by 79 Slovak districts.

METHODS AND DATA

The *r.sun* solar radiation model

Šúri and Hofierka (2004) have developed a comprehensive GIS-based methodology for computation of solar irradiation and irradiance for any geographical region and for any time moment or interval. This solar radiation methodology has been implemented in the *r.sun* module of GRASS GIS (Neteler and Mitasova, 2004). The *r.sun* model has the following key features:

- It is a raster-based GIS program with spatially variable input and output data. Alternatively, selected parameters can be set as constants.
- It is an open source model with available source code for further improvement.
- Provides all components of clear-sky and real-sky solar radiation for irradiation and irradiance values.
- Calculation can be performed assuming solar or civil time.
- It has a large scalability for various spatial resolutions and region sizes. Memory management and code optimization allows to use high resolution data.
- Integration with the open-source environment of GRASS GIS provides another GIS tools for processing input and output data directly within one computing environment.

The *r.sun* model is based on the methodology that uses equations published in the European Solar Radiation Atlas (Scharmer a Greif, 2000). It estimates beam, diffuse and reflected components of clear-sky radiation taking into account attenuation of

extraterrestrial radiation by air-mass and atmosphere turbidity. The real-sky radiation is approximated from clear-sky radiation using clear-sky index representing the attenuation of clear-sky radiation by cloudiness. The map of clear-sky index is usually derived from ground measurements by interpolation or from satellite data. The calculation of irradiation on inclined planes requires the estimation of direct and diffuse components of global horizontal radiation. Similarly to clear-sky index, the ratio of diffuse and global radiation can be derived using ground-based data and spatial interpolation or models based on satellite data.

The *r.sun* model works in two modes. In *mode 1* for the instant time, it calculates raster-based maps of solar irradiance (W.m^{-2}) and solar incident angle (degrees). In *mode 2*, the raster-based maps of daily sum of solar irradiation (Wh.m^{-2}) and duration of the beam irradiation (minutes) are computed from the integration of irradiance values that are calculated at a user-selected time step from sunrise to sunset. If selected, the computation can account for sky obstruction (shadowing) by local terrain features.

By shell-scripting within the Linux operating system environment, these two modes can be used separately or in combination to provide estimates for any desired time step or interval. A theoretical background and possible applications are described in papers by Šúri and Hofierka (2004) and Šúri et al. (2005). Synopsis, description and notes to the command can be consulted in the book by Neteler and Mitasova (2004) and manual page for the *r.sun* module (GRASS 2007).

Recently, the *r.sun* module has been supplemented by another modules based on this methodology that help prepare spatially-distributed solar databases (Šúri et al., 2007). For example, *r.sunyear* calculates the optimal inclination of south oriented planes in order to maximize daily or annual irradiation input with 1° -precision. The module provides the optimized inclination of the plane as well as corresponding global irradiation values including direct, diffuse and reflected components.

The most computationally demanding part of the methodology is the analysis of terrain shadows. The internal procedure of the *r.sun* module can be used or, alternatively, a separate calculation of horizon angles using the *r.horizon* module can be used to speed-up the calculation for large grids. The output of this module is a grid/raster representing angles between horizontal plane and terrain horizon for a specified direction. Series of such grids describing horizon angles for all directions (with a specified step, usually $3.75^\circ - 15^\circ$) can be then used as an input to the *r.sun* module simplifying its internal procedure. The *r.horizon* module as well as the internal shadowing algorithm of the *r.sun* module take into account a curvature of the Earth and angular distortions caused by cartographic projections.

Input data

The input data in our study were prepared using existing data sources that were analyzed and processed in the form required by the *r.sun* and other solar radiation modules in GRASS GIS. These include DTM, measured global and diffuse solar irradiation from ground stations and a map of Linke turbidity coefficient.

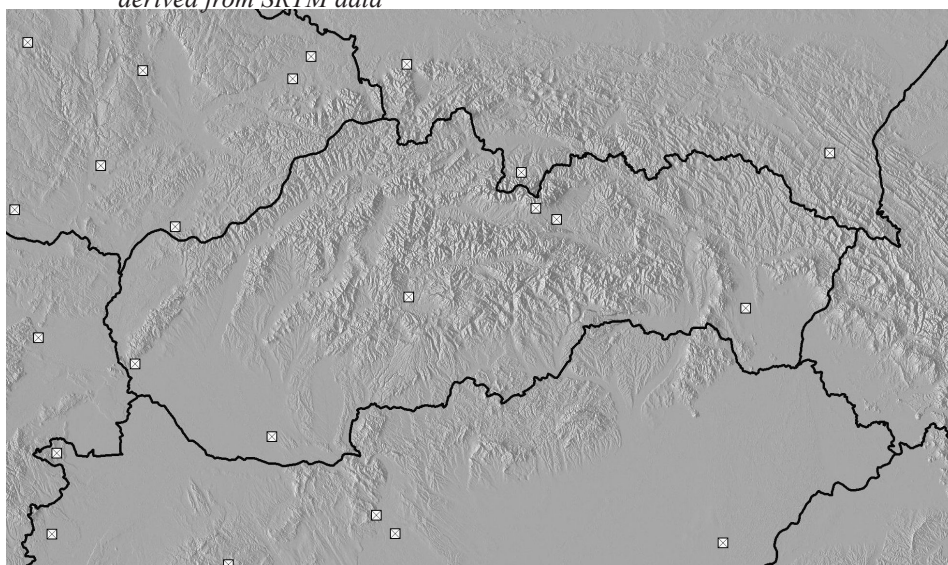
One of key factors affecting the available solar energy is elevation and terrain features. Elevation determines the attenuation of radiation by optical thickness of the atmosphere (air mass). Slope (inclination) and aspect of terrain modify the incident beam, diffuse

and ground-reflected radiation components. In solar energy applications the influence of the slope and aspect is sometimes less evident, as the panels are usually mounted with orientation and inclination maximizing the energy yield, regardless of the local terrain. On the other hand, the neighboring terrain features can considerably change the irradiation patterns in mountains via shadows and visible fraction of the sky. They play an important role especially at low Sun altitudes (in Slovakia during a winter season) and sunrise/sunset times, when even a relatively small terrain feature can present an obstacle for direct solar radiation. Thus the influence of shadows is more pronounced under clear-sky (sunny) weather than overcast (cloudy) conditions when a diffuse component of radiation dominates. The terrain also influences the cloudiness and aerosols distribution and thus indirectly influences the amount of available solar energy.

In a GIS, terrain is represented by a DTM. A horizontal resolution of raster-based DTMs significantly affects the accuracy of modeling and spatial patterns of solar irradiation. The shadows cast by surrounding terrain features are the most sensitive to the resolution. The DTM used in our study is based on the STRM data acquired by spaceshuttle Endeavour mission in 2001 by C-band SAR interferometry instrument (Zyl 2001). These data cover approximately 80% of total Earth surface. In the northern hemisphere the data cover the area up to 60 degrees of north latitude. The original resolution of the data is 1 arcsec and for areas outside the US the 3-arcsec data are freely available that represent approximately a 90-m resolution. The accuracy of 1-arcsec data for the European continent is represented by absolute horizontal error of 8.8 m and absolute vertical error of 6.2 m in 90% of this area (Rodriguez et al. 2006). The available 3-arcsec data in the WGS84 geographic coordinate system were reprojected and resampled to 100-m resolution. The processed 3-arcsec SRTM data present a DTM used in this study (Fig.1). To take into account the shadowing effects of surrounding terrain, a 50-km strip of DTM behind the state border of Slovakia was also included in the analyses. The analysis of shadows on large grids for every day throughout the year means very high computing demands that can be minimized by the *r.horizon* module. A set of 96 data layers representing horizon angles with direction angle step of 3.75° were pre-computed using this module to avoid a slower internal shadowing algorithm and speed-up the calculation in the *r.sun* module.

The ground meteorological stations measuring solar irradiation and other related meteorological parameters (e.g. turbidity, cloudiness, etc.) are usually sparse and heterogeneously located and in most cases they do not represent spatial and vertical variability of solar irradiation adequately. In Slovakia, only 6 meteorological stations with direct measurements of global solar irradiation were available. To use the maximum of available information, these stations have been supplemented by another 16 close-to-border meteorological stations in the neighboring countries totalling to 22 stations used in this study (Fig. 1). The measurement of global and diffuse solar irradiation is needed to assess the ratio of real-sky and clear-sky radiation represented by clear-sky index and its direct and diffuse components used to derive real-sky irradiation on inclined planes (Šúri and Hofierka, 2004). The clear-sky irradiation can be relatively easily computed using the *r.sun* model, however, real-sky irradiation is more dependent on local meteorological conditions (cloudiness) that reduce the amount of available irradiation for energy applications.

Fig. 1: Ground meteorological stations with measured solar irradiation and DTM derived from SRTM data



To prepare spatially-distributed input data (raster-based maps) derived from measurements, interpolation techniques are frequently used, such as splines, weighted averages or kriging (see Hutchinson et al., 1984; Hulme et al., 1995; Zelenka et al., 1992). However, low spatial density of meteorological stations measuring solar irradiation still requires a sophisticated interpolation approach, such as co-kriging (D'Agostino and Zelenka, 1992; Beyer et al., 1997) or multivariate splines (Hofierka et al., 2002, Šúri and Hofierka, 2004), in order to include additional variable (information) from DTMs or satellite images and improve the quality of interpolation. Using this approach, Šúri et al. (2005) have prepared a comprehensive set of various solar irradiation data including the *r.sun* input parameters for Europe that also covers the territory of Slovakia. These data were prepared including the measurements from 22 meteorological stations used in this study. However, a horizontal resolution of these data is 1 km. Therefore the original grid maps were resampled to 100-m resolution used in this study. The resampling was done using spatial interpolation with smoothing that better adopt the original data represented by grid points to a new resolution and minimize the abrupt changes in data. The resolution of 100 m is sufficient with respect to data density of meteorological data and spatial variability of terrain. The transformation was done for beam and diffuse clear-sky index components and Linke turbidity grid maps.

The Linke turbidity maps were originally derived from a global database published by Remund et al. (2003) with the original horizontal resolution of 5' that has been further enhanced to 1-km resolution using the reverse altitude correction and interpolation to match the 1-km DTM variability (Šúri, personal communication).

The beam and diffuse clear-sky index components were derived from monthly averages of meteorological stations measurements of global and diffuse radiation for the

1981-1990 period (Scharmer a Greif, 2000) and clear-sky global irradiation computed using the *r.sun* model (Šúri et al. 2005). The monthly averages of clear-sky index values and ratio of diffuse and global irradiation were interpolated using the *s.vol.rst* module in GRASS GIS containing a tri-variate version of Regularized Spline with Tension (Neteler and Mitasova 2004). As a third, additional variable enhancing the resolution and accuracy of interpolation was used elevation represented by 100-m DTM. Finally, raster -based maps of beam and diffuse irradiation components and clear-sky index required by the *r.sun* model for estimation of real-sky irradiation on inclined planes were derived.

The calculation procedure

The solar database represented by final maps in Figs. 3-6 was computed by the *r.sun* module and above mentioned GRASS GIS modules in these three major steps (Šúri and Hofierka, 2004):

1. Computation of global clear-sky irradiation on a horizontal plane;
2. Calculation of global real-sky irradiation on a horizontal plane and its direct and diffuse components using the beam and diffuse clear-sky index components;
3. Computation of the optimal inclination of the southward-oriented plane to maximize the annual irradiation yield using the *r.sunyear* module and computation of irradiation impinging on optimally-inclined planes.

All databases were derived as spatially distributed raster-based maps representing monthly and annual averages of daily sums of irradiation in kWh/m²/day. For regional analysis and possible supporting schemes the raster-based maps were averaged for spatial administrative units at the NUTS-4 level.

RESULTS AND DISCUSSION

The application of the above mentioned methodology and data have led to creation of a set of raster -based maps with a horizontal resolution of 100 m representing a solar database that can be effectively used for solar energy applications. The database consists of twelve monthly averages and one annual average of daily sums of global irradiation on a horizontal plane under real-sky and clear-sky conditions, spatially-distributed values of optimum inclination angle of a plane (e.g. solar panel) to maximize annual energy yield from solar devices and monthly averages of real-sky global irradiation for optimally-inclined planes. Besides these final data, several raster-based maps that were used in the computation are also available (beam, diffuse, reflected components of global irradiation, Linke turbidity, ratio of diffuse and global irradiation on a horizontal plane, ratio of global irradiation on optimally-inclined and horizontal planes, digital terrain model, etc.).

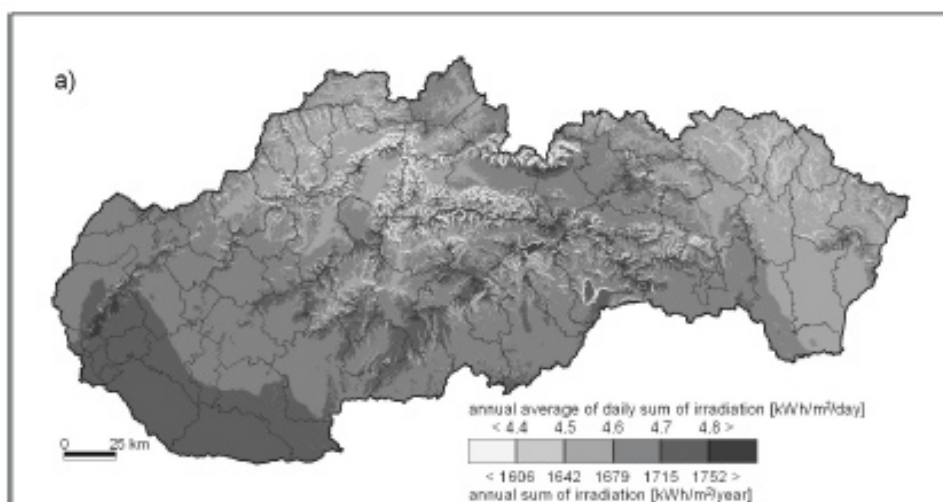
The quality of the model outputs reflects the source data and solar radiation methodology. A high-resolution DTM improved the accuracy of topography factors (relative air mass and shadowing). The real-sky irradiation modeling is more influenced by the lack of representative ground-based measurements reflecting local variations and dynamics of cloudiness. The ground-based measurements were spatially enhanced using a sophisticated tri-variate interpolation method that helped to reflect the local variability of irradiation due to topography. The overall accuracy of the database represented by monthly and annual values of irradiation was assessed using basic statistical measures, the relative mean bias error (rMBE) and relative root mean squared error (rRMSE). The

rMBE in 6 evaluated meteostations in Slovakia reached 3.1% and 2.7% for monthly and annual real-sky irradiation on a horizontal plane, respectively. The rRMSE for monthly and annual irradiation was a bit higher approaching 5.9% and 4.2%, respectively.

The first set of solar resource maps is focused on available clear-sky and real-sky irradiation on a horizontal plane. Solar irradiation on ground-based stations is measured for horizontal planes, so these predictions can be directly compared to measured solar irradiation data. Also, some solar energy devices may need to be installed on horizontal planes, so these maps can be used as a basis for energy generation assessment from a solar system.

The clear-sky global solar irradiation (Fig. 2a-c) presents global irradiation without the influence of cloudiness (sunny conditions). Effectively, it is a maximal irradiation that can be received by the Earth surface without the influence of cloudiness. The clear-sky irradiation, however, contains the influence of turbidity caused by various aerosols in the atmosphere. The clear-sky irradiation maps were computed by the *r.sun* module using DTM, Linke turbidity maps and constant albedo 0.15. The general latitudinal pattern is significantly influenced by topography throughout the year. In December (Fig 2c), however, the shadowing effect of terrain in mountainous areas plays a more important role thus reducing the amount of available solar irradiation in valleys and northern slopes. The maximum values of daily sums of average clear-sky irradiation in June are up to 8.7 kWh/m²/day, in December the amount is reduced to 1.0-1.5 kWh/m²/day, locally even less. The annual sums of clear-sky irradiation on a horizontal plane are within the interval of 1500-1800 kWh/m²/year.

Fig. 2 a, b, c: Annual (a), June (b), and December (c) daily average of global clear-sky irradiation on a horizontal plane



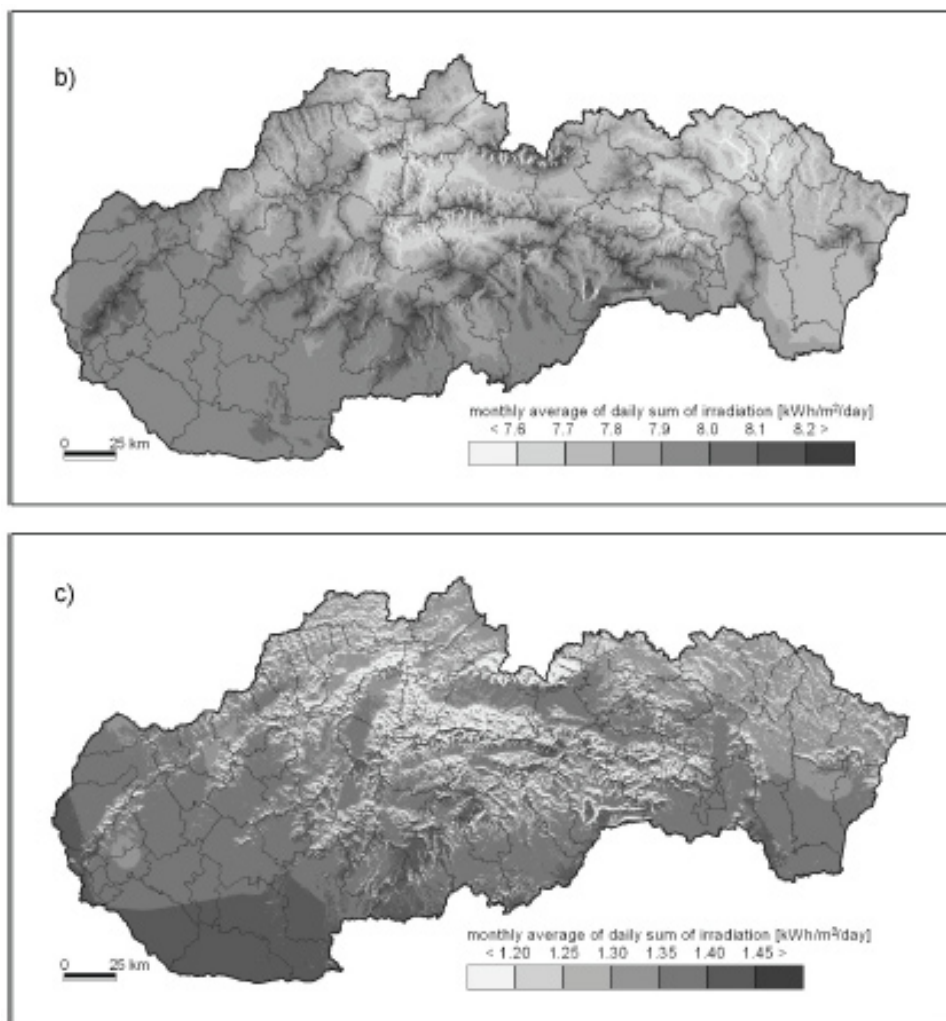
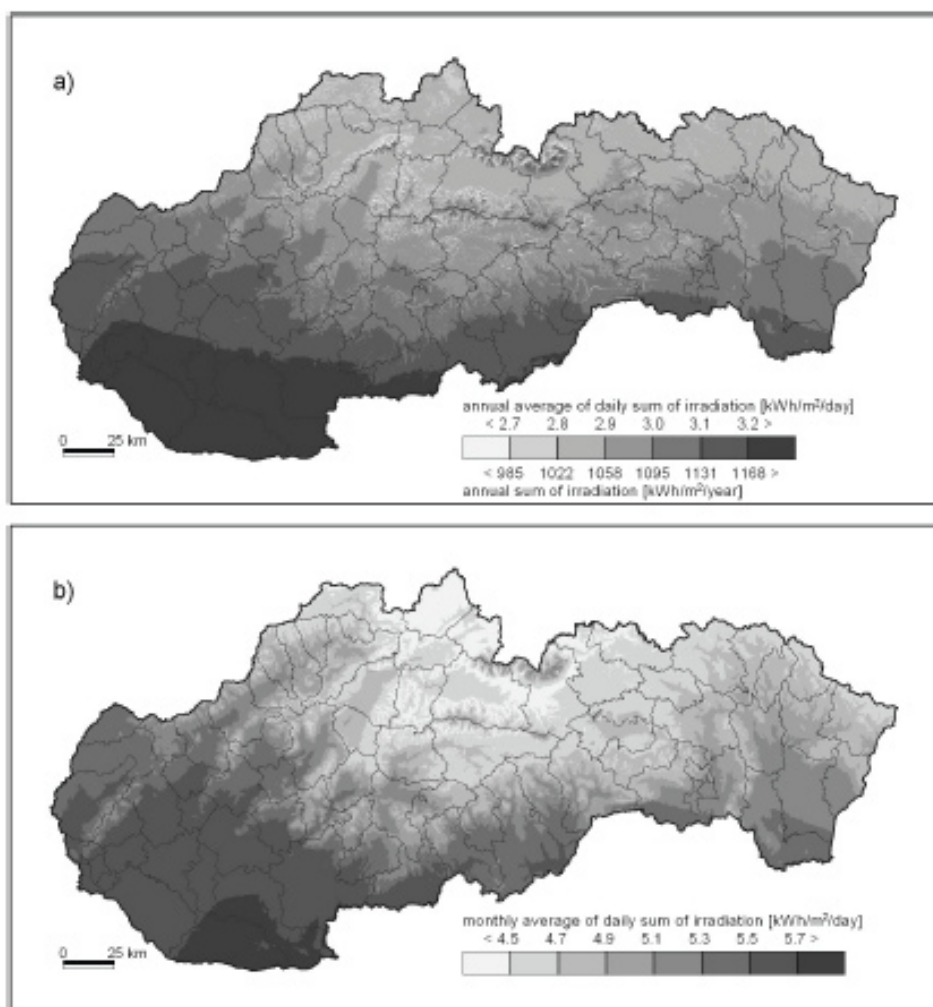
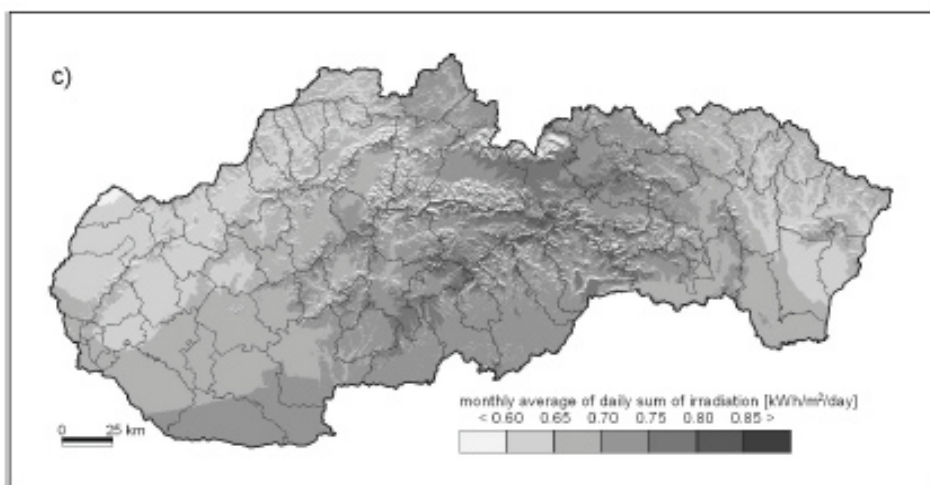


Fig. 3a shows daily sums of annual average of global real-sky irradiation (in kWh/m²/day) incident on a horizontal plane, Fig 3b and Fig 3c show a monthly average for June and December, respectively. The general latitudinal pattern is, similarly to the clear-sky irradiation, influenced by local topography and climate conditions with higher values in the south-west (up to 3.3 kWh/m²/day) and lower values in the north (about 2.7 kWh/m²/day). The average annual value for the territory is about 3.0 kWh/m²/day. The annual sums of real-sky irradiation on a horizontal plane are within the interval of 900-1200 kWh/m²/year. However, the general trend is substantially modified by topography in mountainous areas. Therefore the values of annual average of real-sky global irradiation locally fluctuate with an increase on southern slopes and decrease on northern slopes and very strong decreases in valleys caused by topographic shadows.

Even more striking is the comparison of summer (June) and winter (December) conditions (Fig. 3b vs. Fig. 3c). In December, the amount of available solar irradiation is only 15% of the amount available in June. Also it is clear that during winter the amount of real-sky irradiation in Slovakia is more dependent on local climate and terrain conditions and less on latitude. Low sun altitudes during winters increase the influence of shadows in mountainous areas.

Fig. 3 a, b, c: *Annual (a), June (b), and December (c) daily average of global real-sky irradiation on a horizontal plane*





Slovakia lies in middle latitudes, so it is reasonable to consider the inclination of solar panels in order to increase the irradiation input. In Fig. 4, the optimized values of solar panel inclination are presented to maximize solar energy yield throughout the year. Most areas are in the range of 34 to 46 degrees. The optimization of solar panel inclination leads to a slight increase in daily sums of annual average of global real-sky irradiation received by solar panels (2.9-4.0 kWh/m²/day). The total sum of annual irradiation increased, in average, by 14% compared to horizontal irradiation. The optimization helps especially during winter months when the amount of solar irradiation is low and it is important to capture the maximum of available irradiation (Fig. 5a-c). In December, the amount of solar irradiation received by solar panels is about 30% of summer values (1.0-1.5 kWh/m²/day).

Fig. 4: Optimized inclination of a south-oriented plane to maximize annual energy yield

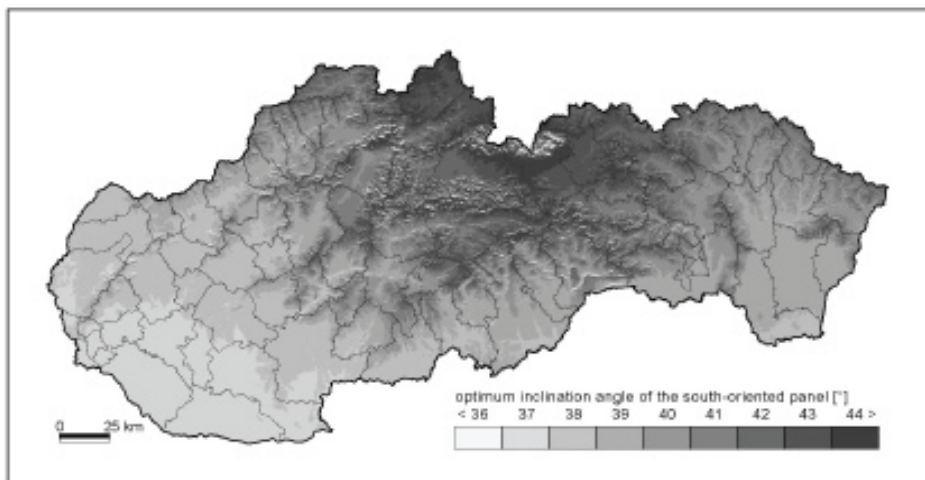


Fig. 5 a, b, c: Annual (a), June (b), and December (c) daily average of global real-sky irradiation on a optimally inclined plane

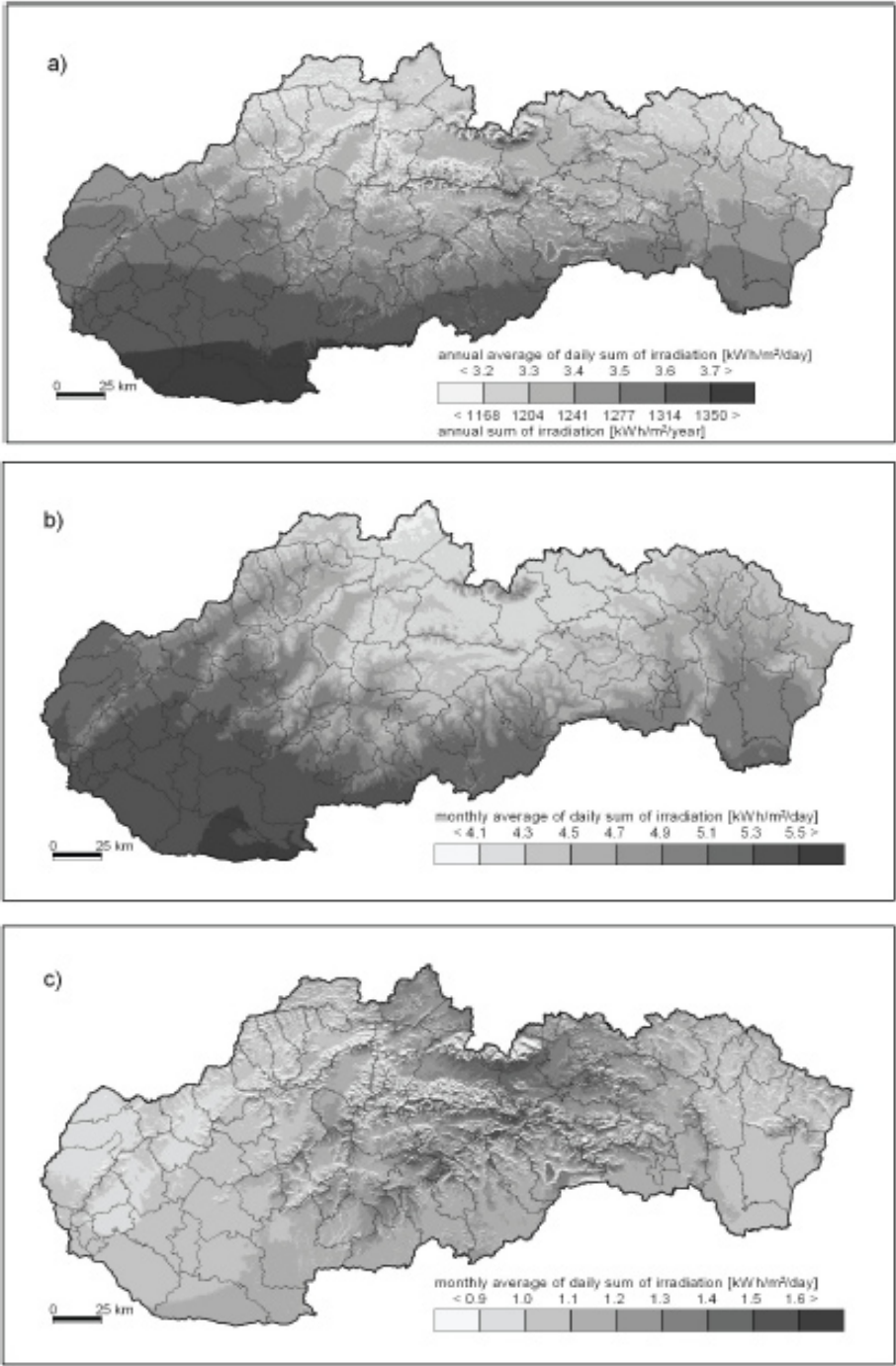
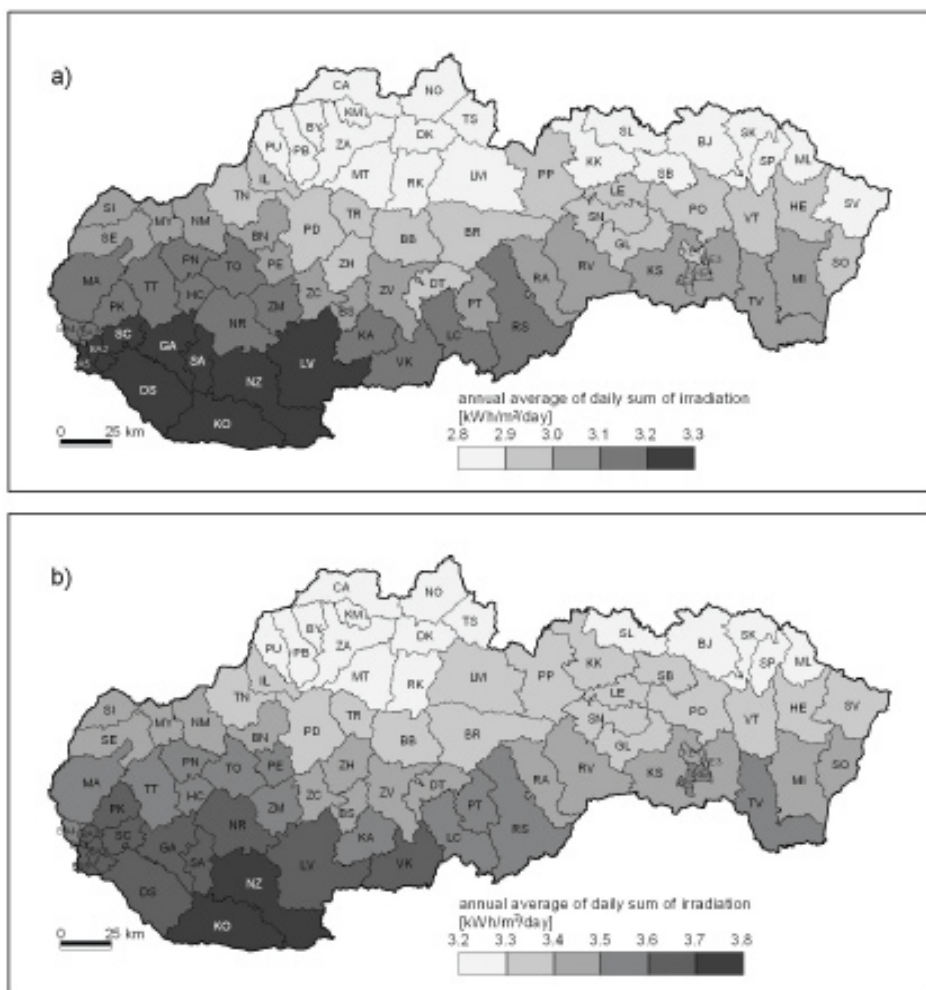


Fig. 6 a, b: Regional variability of available solar energy
 a) horizontal plane b) optimally-inclined plane



The computed values of global real-sky irradiation were averaged for all 79 Slovak districts (Fig. 6). The figure shows the highest potential in southern districts situated in the Danubian lowland with annual daily average of irradiation above 3.2 kWh/m²/day. The values of available solar irradiation decrease in the northern direction with the lowest values just above 2.8 kWh/m²/day in most northern districts. The similar spatial pattern can be observed for average daily sums of irradiation on optimally-inclined planes, however, the minimum values are still above 3.2 kWh/m²/day and maximum around 3.8 kWh/m²/day.

CONCLUSIONS

An improved knowledge of spatial distribution and dynamics of solar energy resources is needed for the inclusion of these environmentally-friendly technologies into energy systems. The increasing share of solar energy in the energy system of many countries, including Slovakia, will require a better understanding of solar radiation and its spatial and temporal distribution. The development of new models, techniques and databases is very important for solar energy utilization and forecasting. Our work provided a methodology and database that can be effectively used in solar system planning by energy industry, utilities, policy-makers and other users of solar technology.

Our study showed that, in Slovakia, the average daily sums of real-sky solar irradiation on a horizontal plane are about 3.0 kWh/m²/day with slightly higher values (3.3 kWh/m²/day) in southern parts of the Slovak territory. Northern, mountainous areas have mixed potential that strongly depends on local topography (areas affected by shadows). The energy yield by solar panels can be increased by optimization of their inclination. The solar panel inclined to 34-46 degrees receive about 2.9-3.8 kWh/m²/day of solar irradiation in 95% of the territory. The study showed a strong seasonal variation of available solar energy with the highest values during summer months. Horizontal planes in December, in average, receive only 15% of solar irradiation available in June. The optimization of solar panel inclination increases the availability of solar energy during winter up to 30% of June values and thus substantially helps to increase the amount of received irradiation in seasons when the amount of solar energy is naturally low.

In the regional context the most benefiting districts are Komárno and Nové Zámky situated in Danubian lowland with favorable climatic conditions for the utilization of solar energy. It can be noted that several districts with favorable conditions for the utilization of solar energy are amongst the poorest in Slovakia and even in the European Union. Northern, mountainous regions have mixed conditions that require a detailed analysis highly dependent on local topography and geographical conditions.

The presented solar resource database is based on the *r.sun* model and its methodology linked with the open-source environment of GRASS GIS, ground-based measurements of solar irradiation and tri-variate spatial interpolation methods. The future improvement of solar resource databases can rely more on satellite data that reduce the sparsity of current meteorological network in Slovakia.

Acknowledgement: This research was supported by VEGA Grant Agency of the Slovak Republic within the scientific project No. 1/3049/06 and Research Action no. 13106 – Photovoltaic Solar Electricity. The authors would like to thank to Marcel Šúri, Thomas Huld and Ewan Dunlop for helpful comments and discussions.

References

- BEYER H.G., CZEPLAK G., TERZENBACH U., WALD, L. (1997): Assessment of the method used to construct clearness index maps for the new European solar radiation atlas (ESRA). *Solar Energy*, 61, 389-397.
- D'AGOSTINO V., ZELENKA, A. (1992): Supplementing solar radiation network data by co-kriging with satellite images. *International Journal of Climatology*, 12, 749-761.
- DUBAYAH, R., RICH, P. M. (1995): Topographic solar radiation models for GIS. *International Journal of Geographical Information Systems*, 9, 405-419.
- FU, P., RICH, P. M. (2000): The Solar Analyst 1.0 User Manual. Helios Environmental Modeling Institute, <http://www.hemisoft.com>.
- GRASS, 2007, GRASS Development Team. GRASS GIS. [Online]. Available: <http://grass.itc.it/>
- HETRICK, W. A., RICH, P. M., BARNES, F. J., WEISS, S. B. (1993): GIS-based solar radiation flux models. *American Society for Photogrammetry and Remote Sensing. Technical papers. GIS, Photogrammetry and Modeling*, 3, 132-143.
- HOFIERKA, J. (1997): Direct solar radiation modelling within an open GIS environment. *Proceedings of the Joint European GI Conference 1997, Vienna*, 575-584.
- HOFIERKA, J. (2004): Modelovanie priestorovej distribúcie slnečného žiarenia na georeliéfe pomocou modelu r.sun a geografického informačného systému. *Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešoviensis. Prírodné vedy, Folia Geographica* 7, pp. 157-166.
- HOFIERKA, J., PARAJKA, P., MITASOVA, M., MITAS, L. (2002): Multivariate interpolation of precipitation using regularized spline with tension. *Transactions in GIS*, 6, 135 - 50.
- HRVOL', J. (1996): Irradiation of south oriented surfaces by direct solar radiation. *Acta Met. Univ. Comenianae*, 25, 17 - 27.
- HRVOL', J., HORECKÁ, V. (2000): Contribution to computation of daily sums of global radiation. *Acta Met. Univ. Comenianae*, 29, 9-25.
- HRVOL', J., TOMLAIN, J. (1992): Globálne žiarenie na rôzne orientované sklonené plochy na území Slovenskej republiky. *Štúdiá X., roč. VI., Slovenská bioklimatologická spoločnosť pri SAV, Bratislava*.
- HRVOL', J., TOMLAIN, J. (1997): Globálne žiarenie na území Slovenska za obdobie 1961 - 1990. *Bulletin Slovenskej bioklimatologickej spoločnosti SAV*, XVI, 26, 3-17.
- HULME, M., CONWAY, D., JONES, P.D., JIANG, T., BARROW, E.M., TURNEY, C.A. (1995): 1961-1990 climatology for Europe for climate change modelling and impact applications. *International Journal of Climatology*, 15, 1333-1364.
- HUTCHINSON, M. F., BOOTH, T. H., MCMAHON, L. P., NIN, H. A. (1984): Estimating monthly mean values of daily total solar radiation for Australia. *Solar Energy*, 32, 277-290.
- JÄGER-WALDAU, A. (2005): PV Status Report 2005. Research, Solar Cell Production and Market Implementation of Photovoltaics. European Commission, DG JRC, Institute for Environment and Sustainability, Renewable Energies Unit, EUR 21836 EN, p. 99.
- JENČO, M. (1992): Distribúcia priameho slnečného žiarenia na georeliéfe a jej modelovanie pomocou komplexného digitálneho modelu reliéfu. *Geografický časopis*, 44, 342- 355.

- KITTLER, R., MIKLER, J. (1986): Základy využívania slnečného žiarenia. Bratislava, Veda
- KRCHO, J. (1990): Morfometrická analýza a digitálne modely georeliéfu. Bratislava, Veda
- MÉSZÁROŠ, I. (1998): Modelovanie príkonu slnečnej energie na horské povodie. *Acta Hydrologica Slovaca*, 1, 68-75.
- NETELER, M., MITASOVA, H. (2004): *Open Source GIS: A GRASS GIS Approach*, Kluwer Academic Publishers, Boston
- REMUND, J., WALD, L., LEFEVRE, M., RANCHIN, T., PAGE J. (2003): Worldwide Linke Turbidity Information. *Proceedings of ISES Solar World Congress*, 16-19 June 2003. Goteborg, Sweden.
- RODRÍGUES, E. MORRIS C., S., BELZ, J., E. (2006): A global assessment of the SRTM Performance. *Photogrammetric Engineering & Remote Sensing*, 72, 249-260.
- SCHARMER, K., GREIF, J., (eds.) (2000): *The European Solar Radiation Atlas. Vol. 2: Database and Exploitation Software*. Presses de l'Ecole des Mines de Paris, Paris, France.
- ŠÚRI M., HULD T. A., DUNLOP E. D. OSSENBRINK H. A. (2006): Geographical aspects of solar electricity generation in Europe. In: Dunlop, E., Wald, L., Šúri, M. (Eds.), *Solar Energy Resource Management for Electricity Generation from Local to Global Scale*. Nova Science Publishers, Hauppauge, ISBN: 1-59454-919-2
- ŠÚRI M., HULD T. A., DUNLOP E. D. OSSENBRINK H. A. (2007): Potential of solar electricity generation in the European Union member states and candidate countries. *Solar Energy* (in press).
- ŠÚRI, M. (2002): Modelovanie a kartografické zobrazovanie globálneho žiarenia. In Feranec, J. Pravda J., eds. *Proceeding of the workshop „Aktivity v kartografii 2002“*, Bratislava (Slovak Cartographic Society and Institute of Geography SAS), 31.10.2002, 126-133.
- ŠÚRI, M., HOFIERKA, J. (2004): A New GIS-based Solar Radiation Model and Its Application to Photovoltaic Assessments. *Transactions in GIS*, 8, 175-190.
- ŠÚRI, M., HULD, T.A., DUNLOP, E.D., (2005): PVGIS: a web-based solar radiation database for the calculation of PV potential in Europe. *International Journal of Sustainable Energy*, 24, 55-67.
- ŠÚRI, M., JONES, A.R., DUNLOP, E. D. (2002): Mapping the potential of photovoltaic systems in urban areas of Slovakia. In: Brebbia, C.A., Martin-Dunque, J.F., Wadhwa, L.C. (Eds.) *The Sustainable City II, Urban Regeneration and Sustainability*. WIT press (Southampton). 1007-1016.
- ŠÚRI, M. (2006): Slnečná elektrina a perspektívy jej výroby na Slovensku. *Životné prostredie*, 40, 127-132.
- TOMLAIN, J., HRVOJ, J. (2002): Mapa globálneho žiarenia (1:2 000 000). In *Atlas krajiny Slovenskej republiky*, 1. vydanie, Bratislava (Ministerstvo životného prostredia SR), Banská Bystrica (Slovenská agentúra životného prostredia).
- WILSON, J. P., GALLANT, J. C. (2000): Secondary topographic attributes. In: Wilson, J.P. and Gallant, J.C. (eds) *Terrain Analysis; Principles and Applications*. New York, Wiley, 87-132.
- ZELENKA, A., CZEPLAK, G., D'AGOSTINO, V., JOSEFSON, W., MAXWELL, E., PEREZ, R. (1992): *Techniques for Supplementing Solar Radiation Network Data*, Technical Report, International Energy Agency, # IEA-SHCP-9D-1, Swiss Meteorological Institute, Switzerland.

ZYL, J. J. (2001): The shuttle radar topography mission (SRTM): a breakthrough in remote sensing of topography. Acta Astronautica, 48, 559-565.

PRIESTOROVO DISTRIBUOVANÝ ODHAD SOLÁRNYCH ZDROJOV PRE ENERGETICKÉ APLIKÁCIE NA SLOVENSKU

Zhrnutie

Slnčná energia je jeden z obnoviteľných zdrojov energie, ktorého význam neustále narastá. Súvisí to s environmentálnymi nákladmi, obmedzenými zásobami fosílnych palív a poklesom nákladov na využívanie solárnej technológie pri výrobe tepla, na chladenie alebo výrobu elektrickej energie. Dostupnosť slnečnej energie na zemskom povrchu závisí od viacerých faktorov. Okrem zemepisnej šírky a astronomických faktorov spôsobujúcich sezónnosť v množstve slnečnej energie sú predovšetkým klimatické faktory (napr. oblačnosť, zákal atmosféry) a georeliéf. Cieľom predloženého príspevku je vytvorenie priestorovo distribuovanej solárnej databázy o zdrojoch slnečnej energie pre územie Slovenska zachytávajúcej priebeh dostupnosti slnečnej energie v priebehu kalendárneho roka. Pri jej vytvorení sa využili klimatické pozorovania z pozemných staníc, ale tiež informácie z existujúcich databáz. V podmienkach členitého reliéfu Slovenska má pre presnosť databázy veľký význam digitálny model reliéfu (najmä pre analýzu zatienenia).

Pri tvorbe databázy sme použili digitálny model reliéfu s rozlíšením rastra 100 m a interpolačné metódy na báze regularizovaného splajnu s tenziou. Pomocou modelu r.sun implementovaného v geografickom informačnom systéme GRASS sme vypočítali množstvo dostupného slnečného žiarenia pre celé územie Slovenska, a to pre horizontálnu rovinu (horizontálne umiestnené panely) a roviny s náklonom optimalizovaným pre maximálny zisk slnečnej energie (Obr. 4, Obr. 5). Tieto analýzy boli vykonané pre jednotlivé mesiace v kalendárnom roku. Výsledky ukazujú, že najvyšší potenciál pre využitie slnečnej energie je na južnom Slovensku, kde dosahuje priemerné ročné hodnoty až 3,3 kWh/m²/deň. V členitom reliéfe severného a stredného Slovenska je využiteľnosť významne ovplyvnená formami okolitého reliéfu (napr. údolné polohy majú menej dostupného žiarenia pre zatienenie okolitým reliéfom). Priemerná ročná hodnota dostupného žiarenia na horizontálnu plochu za jeden deň je okolo 3,0 kWh/m²/deň. Medzi okresy s najvyšším priemerným potenciálom patria okresy Nové Zámky a Komárno s priemernými hodnotami za okres 3,3 kWh/m²/deň (Obr. 6). Najnižšie hodnoty dosahujú severné okresy s priemernými hodnotami okolo 2,8 kWh/m²/deň.

Obr. 1: Pozemné meteorologické stanice s meraním slnečnej radiácie a digitálny model terénu odovodený z dát SRTM

Obr. 2: Priemerný denný úhrn globálneho žiarenia pri jasnej oblohe na horizontálnu rovinu a) ročný, b) za mesiac jún, c) za mesiac december

Obr. 3: Priemerný denný úhrn globálneho žiarenia na horizontálnu rovinu a) ročný, b) za mesiac jún, c) za mesiac december

Obr. 4: Uhol optimálneho naklonenia južne orientovaného panelu s maximálnym celoročným energetickým ziskom slnečného žiarenia

- Obr. 5: Priemerný denný úhrn globálneho žiarenia na optimálne naklonenú južne orientovanú rovinu a) ročný, b) za mesiac jún, c) za mesiac december*
- Obr. 6: Regionálna variabilita slnečnej energie v rámci okresov Slovenska pre a) horizontálnu rovinu b) optimálne naklonenú rovinu*

Recenzovali: Prof. Ing. Vladimír Sedlák, PhD.
Prof. RNDr. Eva Michaeli, PhD.

ENVIRONMENTAL LOADS AND LAND STABILITY

**Ondrej HRONEC¹, Patrik ŠKULTÉTY²,
Emília HUTTMANOVÁ³, Margita VILIMOVA⁴**

Abstract: Environmental loads are one of the main all-society problems these days. Problems resulting from a decline in the environmental quality have given rise to increased efforts for elimination of the negative consequences and improvement of damages caused in the past. The mining of ore, their processing, generation of electrical energy from less quality coal caused abnormal charge of land, where was realized. At the present, in Slovakia there are registered eight areas with the excessively damaged quality of the environmental components. Four from them are located in the east part of Slovakia. In each of them is necessary to appoint a specific approach, how the issue of an environmental status should be solved.

Key words: environment, quality, heavy metals, acidification, polluted regions

PREFACE

Old environmental loads are all-society problem, which must be solved immediately. Under this term we understand generally old dumping places of waste, old mining pollutants, waste piles, decanting plants and others old mining objects, places polluted by army activities and others sources of pollution, for example: companies areas, agricultural yards, dung-yards, etc., which can be important source of pollution for ground and surface water, hornblende environment and atmosphere and soils. Through these elements can be endangered human and animal health.

In other words: under old environmental load we understand such anthropogenic intervention into environment that has arisen in the past and persists up to the present day, whereby source of pollution can be removed or is still active.

Serious problem are old mining objects, there are more than 17 thousand of them in Slovakia, and they include waste dumps (6 418), adits (4 913), ping tors (4 556) and decanting plants (10).

Another negative effect was and still is derogating of soils, plants and biota at all by air pollutants from industry, energetics, traffic and other sources of pollutants.

-
- 1 **Prof. h.c. prof. Ing. Ondrej Hronec, DrSc.,**
Fakulty of Management, Univerzity of Prešov, e-mail: Ondrej.Hronec@uniag.sk
 - 2 **Ing. Patrik Škultéty,**
Horticulture and Landscape Engineering Faculty, Slovak University of Agriculture in Nitra, e-mail: skultety@pathox.sk
 - 3 **Ing. Emília Huttmanová, PhD.,**
Fakulty of Management, Univerzity of Prešov, e-mail: emilia.huttmanova@gmail.com
 - 4 **Ing. Margita Vilimová,**
Horticulture and Landscape Engineering Faculty, Slovak University of Agriculture in Nitra, e-mail: vilimovam@post.sk

Acidification, alkalization, metallization of soils – those are exclamation marks of past when economic activity was thoughtless to the environment. And so we are mapping and evaluating remained old environmental loads.

Slovakia as a part of Czechoslovakia belonged, in previous social system, to so-called advanced industrialized countries. Special emphasis was put on growth of heavy industry. As much as 65% of state armament production was realized in Slovakia, what has requested significant demands on natural resources and energy. Ores mining, their processing, generation of electric power out of bad quality coal, it all caused overloading of environment, in which they were realized. Country was endangered, destabilized. On the other site it showed economic prosperity, that means ecology was not conformable with economy.

Second aspect of this issue incurred differences between regions in environment components quality, what we can see till these days.

Works of Bielík et al. (1998), Čurlík a Šefčík (1999), Hronec et al. (2006), Hronec, Tóth a Holobradý, Kobza et al. (2000), Vilček (1998, 2004a, 2004b) a Andrejovský (2002) discuss these issues.

SOURCE AND METHODOLOGY

Regions in Slovakia have different status of environmental load following the natural conditions, anthropogenic activities, whereupon risk factors in regions are applied also at different degree. According to enactment no. 17/1992 Statute, s. 17, article 17 about environment: „Land should not be loaded by human activity over the level of bearable load. Acceptable level of environmental deterioration is defined by limit values that are set by special directives. These values are defined in accordance with accessible knowledge condition without endangering human health as well as others living organisms and environmental components. “In this sense we are solving research projects directed into the analysis of environmental components and its using agriculture restructuring and sustainable development securing in problem area of Severný Gemer, and into the identification of environmental components changes in others problems area of East Slovakia with the view to acquire new knowledges for execution of environmental components revitalization program. We also analyse the quality of environmental components within Slovak Republic in relation to settlement.

In our work we act upon methodology set for analyzing the environmental components, especially air and soil and in terms of present laws and regulations.

RESULTS AND DISCUSSION

Following the complex evaluation of air condition, quality of ground and surface waters, hornblende environs, biota, waste disposal in relation to health and environmental protection, as well as others risk factors, areas in fifth degree of environment quality were specified in Slovakia, as areas with the most disturbed environment. They represent centre of each loaded area and in Slovak Republic their acreage is 2109 km² (4,3 % of state acreage), and population of 1 262 000 people (23 %) is living in these areas. Area in fourth degree of air quality is part of loaded areas with acreage 2 759 km² (5,7 %), where live 752 000 citizens and presenting (14 %). It means, that in loaded areas of Slovak Republic on overall area of 4 868 km² what presents 10 % of overall acreage of soils in

Slovak Republic live 2 014 000 citizens, what presents more than 35 % citizens in Slovak Republic. From this number in loaded areas in Slovakia 2578 km² live 671 000 citizens in Prešov and Kosice county. It presents 16,42 % of overall acreage of these counties, in which live around 650 000 citizens (42,8 %). Analysis of each loaded areas in Slovak Republic shows table bellow.

Tab. 1: *Loaded areas in Slovakia and their contaminants*

LOADED AREA	ACREAGE KM ²	NUMBER OF CITIZENS	CONTAMINANTS	LOCATION OF LOADED AREAS WITHIN COUNTIES %
Bratislavská	488	432 000	SO ₂ , NO _x , CS ₂ , F, Pb, Cd, As	Bratislavský – 93% Trnavský – 7%
Dolnopovažská	1261	247 000	SO ₂ , NO _x , Ni, Cr, dust, flue ash	Nitrianský – 66% Trnavský – 34%
Ponitrianska	450	272 000	SO ₂ , NO _x , Pb, Cu flue ash with content of As, Cd,	Nitrianský – 51% Trenčianský – 49%
Pohronská	203	186 000	F, SO ₂ , NO _x , flue ashes	Banskobystrický – 100%
Jelšavsko – lubenícka	137	21 000	Mg, dust, SO ₂ , NO _x , Mn, As, Cd, Hg, flue ash	Banskobystrický – 100%
Rudniansko – gelnická	357	52 000	Hg, Cu, Pb, As, Zn, Cd, SO ₂ , NO _x ,	Košický – 95% Prešovský – 5%
Košicko – prešovská	1044	425 000	SO ₂ , NO _x , Mg, Fe, Mn, Cr	Košický – 81% Prešovský – 19%
Zemplínska	1040	173 000	SO ₂ , NO _x , F, NH ₃ , organic pollutants	Košický – 83% Prešovský – 17%

Source: SEA

According to updated environmental regionalization completed in 2004, result of which is evaluative map (SEA) of environment quality in five degrees (from high quality environment, to heavy disturbed environment), loaded areas in the eastern part of Slovakia were pecified in size and population under the names Jelšavsko – lubenícka, Rudniansko – gelnická, Košicko – prešovská a Zemplínska.

In the air different processes are in progress that lead to chemical changes e.g. by photolysis, oxidation, sorption on aerosols in the air and compounds with toxic effect, as well as their precursors, can arise. An example of this is tropospheric ozone, which accrues from photochemical reactions of hydrocarbon and dioxide nitrogen, and is considered to be the most serious stressful factor for the ecosystems and vegetation. While in years 1970 – 1990 the rise of ozone concentration was heightening in average of 1 µg.m⁻³ per year, after year 1990 the rise of ozone, in our country as well as in Central Europe, has slowed down or stopped what match with trend in progress of O₃.

In term of ecosystem and vegetation protection, regulation of Ministry of environment of the Slovak Republic no. 705/2002 sets limit values for SO₂ a NO_x. Target values and long-term objectives are also set for ozone. According to Appendix 3 of cited regulation special localities for SO₂ a NO_x measuring should be placed more than 20 km from agglomeration or more than 5 km from other built-up areas, industrial objects or highways.

Particular member state of EU can place measuring locality in smaller distance or so that it may represent the air quality considering geographic conditions. As we can see it is about measuring regional air pollution, and thus acting of harmful pollutants in regional measure. In regional measure those harmful pollutants are implemented, which abundance time in atmosphere takes several hours to several days and so they can be translocated far from emission sources. Such a harmful pollutant is especially SO₂, NO_x hydrocarbons and heavy metals.

At the present time there are 5 regional stations for monitoring of air pollution and rain waters chemical composition (in 1999 monitoring was stopped in stations in Milhostov and Mochovce) in Slovak Republic. Out of this in eastern part of Slovakia are 2 stations: in Stará Lesná (since 1992 part of EMEP) and in station in Starina (since 1994 part of EMEP). Their aim is to monitor and evaluate level of regional air pollution, thus continuous effect on natural environment, different ecosystems and vegetation including measuring of ozone, which is measured in eastern part of Slovakia also in mountain stations Štrbské Pleso, Kojšovská hoľa a Lomnický štít.

Air pollution cannot be separated from pedosphere and hydrosphere pollution, as integral parts of environment. Catharsis of air takes place at the expense of soil and water, what has negative impact on soil abilities to insure health products for direct consummation, food industry as well as health forage crops that affect the quality of animal products. Polluted air combined with unqualified agricultural intensification as well as influence of pollutants and others anthropic and natural resources in certain concentration has harmful effect on soil, they invoke changes in physical, chemical and biological soil attributes, they have negative influence on soil productive potential, on nutritional, technological and sensorial value of agricultural products. Increased values of hazardous substances in soil in loaded areas of Eastern Slovakia result also from natural endogenous geochemical anomalies.

Chemical degradation of soil is caused by soil contamination with heavy metals and organic contaminants, by acidification, alkalization and salinization.

In term of danger heavy metals entry into the food web we think of soil contamination by non-degradable heavy metals such as Hg, Cu, As, Pb, Zn and Cd in Rudniansko-gelnická loaded area as well as in the surrounding of Nižná Slaná as the priority within the frame of solving our project. These soils can be found especially in area of Rudňany, Jaklovce, Gelnica, Slovinky, Olšo, Poráč. In area of Spišsko - gemerské rudohorie the largest association of heavy metals is situated, whereby the distinctive correlation between contents of some heavy metals has been found out (Čurlík - Šefčík, 1999, Kobza et al. 2000). Mineralized areas are enriched by numerous heavy metals. Diffusion contamination of soil by heavy metals is shown by uneven distribution of elements, whereby local concentration markedly exceeds limit values of risk factors in agricultural land that are set by legislative.

Area contaminations (diffusive) over the limit values of As and Hg, can be found in the surrounding of Nižná Slaná and Slaná river-basin. Over the limit values of Hg, As, Pb, Cd, Cu, Zn can be found at Stredný Spiš, than in Zemplínska loaded area – there are 2 samples over the limit B for Ni and Cr, northerly from Humenné and in south part of Zemplín there is 1 sample of As over the limit B (Tisa river-basin), 1 sample of Cu over the limit in Medzibodrožie and in Košicko – prešovská loaded area Cu, As and Hg are over the limit in Hornád river-basin.

For valuation of soil contamination it is necessary to take into consideration contents of humus, clay elements and soil reaction. In Zemplínska loaded area will be necessary to valuate hazards of crop contamination by PCB, in the surrounding of Strážske with higher levels in soil in relation to content of humus and soil reaction. In this location it will be also necessary to evaluate and map deported wastes of PCB, old ecological loads, bottom sediments of Laborec, Zemplínska Šírava as well as way of PCB degrading (degrading potential of organic contaminants in soil and water solubility).

Despite of sooner formulated corrective steps, after chemical degradation of soil it will be needed to re-evaluate soils inclination or resistance to acidification in relation to base rocks, systems buffer as well as alkaline soils in the surrounding of magnesite plants and saline soils at VSN in relation to climate warming, evaporation raising and accumulation of salt in soil.

In term of sustainable development of agricultural soil utilization it is needed (statute no. 220/2004 Z.z.): „to utilize and protect soil properties and functions in such way and in such range so its biological diversity, productivity, renewal ability and ability to perform all functions will be well-preserved“. Therefore it is necessary, within the project, in the loaded areas to synthesize actual knowledges about soil properties especially in light of their development, especially results from 1st and 2nd cycle of monitoring by SSCRI and other research places, agrochemical properties of soils such as agrochemical reaction, nutrient content, humus quantity and quality, content of carbonates by HPJ that are characteristic for particular localities.

Next it is needed to pay attention to physical properties of soils, deterioration of which, caused especially by incorrect cultivation, is the problem of the most productive soils of eastern part of Slovakia following the intensive utilization. Out of physical degradation, in the eastern part of Slovakia, water erosion is the biggest problem; on the flat to middle gradient slopes of flysch and volcanic highlands it is accelerated liquidation of anti-erosion effective degrees, balks and by incorrect crop rotation. In areas of Easter Slovakia – Ondavská vrchovina and flysch uplands in Ulič –sensitive to erosion, selected erosive slopes (slope gradient 8 – 14°) are situated, erosion on which has the distinctive impact on soil properties, especially on the soils with lower content of humus and clay elements in surface level. Intensive erosion – accumulative processes are in progress here. Therefore is necessary pay attention to anti-erosion protection, especially to increasing of infiltration soil capacity and prevention its surface outflow (especially on extremely eroded very steep lands).

CONCLUSION

Industrial production focused on inconsiderate usage of natural resources, energy demanding technologies and preference of economy without reference to consequences in natural environment caused to abuse of ecological stability in some regions of our state. Full-area fact is acidification. Around exhalation resources, where amounts of heavy metals were accumulated with all consequences. Some thousands acres of Slovak soil are heavy alkalized (surroundings of magnesia factories, cement factories and limestone quarries), whereby the ecosystems are very devastated. This shows that ecological land security is disturbed and so without life. Erosion is also associated to this fact, which takes the smallest soil elements from fields. Even though these facts

are very good known in present, they are not researched very well. Also in loaded areas all necessary arrangements to preservation of sustainability are missing and also their application in praxis.

In consequence of several changes in land the activity in agricultural land is limited. As a part of ecological land stability will be necessary to prefer permanent grassy vegetations for biodiversity preservation of nature.

Acknowledgement: Contribution has arisen as a part of APVV-20-06080, APVV-20-060505 and VEGA 1/3463/06 projects solving.

Reference

- ANDREJOVSKÝ, P. (2002): Ekologicko-ekonomické problémy poľnohospodárskej výroby vo vybraných oblastiach Slovenska, dizertačná práca, SPU – FEM, DP Košice 2002, 130 s.
- BIELEK, P. et al. (1998): Naše pôdy. Bratislava : VÚPÚ, 1998. 80 s. ISBN 80-85361-42-6.
- BUJNOVSKÝ, R. (2000): Zásady správneho používania hnojív. Kódex správnej poľnohospodárskej praxe v SR. Bratislava : MP SR, VÚPOP, 2000. 34 s. ISBN 80-85361-71-X.
- ČURLÍK, J., ŠEFČÍK, P. (1999): Geochemický atlas Slovenskej republiky. Bratislava : MŽP SR, 1999. 184 s. ISBN 80-88833-14-0.
- HRONEC, O., KOVÁČ, K., HRIČOVSKÝ, I., MACÁK, M., ADAMIŠIN, P., DAŇOVÁ, M., EFTIMOVÁ, J. (2006): Environmentálne aspekty poľnohospodárskych technológií. Nitra: Slovenská poľnohospodárska univerzita, 2006. 170 s. ISBN 80-8069-694-2.
- KOBZA, J. et al. (2000): Súbor účelových máp znečistených oblastí SR. Bratislava : VÚPOP, 2000. 32 s. ISBN 80-85361-69-8.
- MATI, R., GOMBOŠ, M. (2002): Možné dôsledky globálnej klimatickej zmeny na poľnohospodárstvo VSN. In Očakávané globálne zmeny klímy a ich možný dopad na vodný režim, poľné a lesné hospodárstvo. Zb. č. 27 SAPV, 2002, s. 57 – 61, ISBN 80-968665-3-2.
- VILČEK, J. (2004a): Geografia poľnohospodárskych pôd VSN. In Folia Geografica. č. 7, roč. XLII. Prešov : PU, 2004. s. 220 – 247 ISBN 80-8068-70-4.
- VILČEK, J. (2004b): Ekonomický, energetický a environmentálny potenciál poľnohospodárskych pôd. In Zborník z medzinár. ved. konferencie Regióny – Vidiek – Životné prostredie, Nitra : SPU, 2004. ISBN 80-8069-438-9.
- VILČEK, J. (1998): Interpretácia bonitácie pôd na Východoslovenskej nížine. In Trvalo udržateľný rozvoj poľnohospodárskej výroby na regionálnej úrovni. Michalovce: OVÚA, 1998. s.207-212.

DOPADY ENVIRONMENTÁLNYCH ZÁŤAŽÍ NA STABILITU KRAJINY*Zhrnutie*

Staré environmentálne záťaže sú celospoločenským problémom, ktorý sa musí neodkladne riešiť. Pod pojmom staré environmentálne záťaže rozumieme staré skládky odpadov, staré banské diela, haldy, odkaliská a iné objekty bývalej banskej činnosti, územia znečistené militantnými organizáciami a inými činnosťami, napr. zdroje znečistenia pochádzajúce z priemyselných simplexov, produktovodov, agrárnych simplexov atď. Tieto lokality môžu byť významným zdrojom znečistenia podzemnej a povrchovej vody, horninového prostredia a ovzdušia a pôd a tým aj rastlinnú výrobu a zvyšné rastlinné asociácie v krajine. Cez environmentálne záťaže môže byť ohrozené zdravie človeka, hospodárskych zvierat a fauny vôbec.

Slovensko ako súčasť Československa patrilo v bývalom spoločenskom systéme k tzv. priemyselne vyspelým krajinám. Zvláštny dôraz bol kladený na rozvoj ťažkého priemyslu. Na Slovensku sa realizovalo až 65% zbrojárskej výroby štátu, čo si vyžadovalo vysoké nároky na prírodné zdroje a energiu. Ťažba rúd, ich spracovanie, výroba elektrickej energie z málo kvalitného uhlia spôsobili nadmerné environmentálne záťaže priestorov, kde sa realizovali. Krajina bola ohrozená, destabilizovaná a vznikli veľké rozdiely medzi regiónmi v kvalite zložiek životného prostredia, čo sa prejavuje doposiaľ.

Recenzovali: Prof. RNDr. Eva Michaeli, PhD.

Prof. Ing. Jozef Vilček, PhD.

DEVELOPMENTAL POSIBILITIES AND LIMITS IN MODELS OF SELECTED REGIONAL SYSTEMS

Vladimír IRA¹, Milan LEHOTSKÝ²

Abstract: *This paper attempts to assess the effects of several factors on spatial organisation, regional disparities and development in two marginal districts of eastern Slovakia (Bardejov and Rimavská Sobota) that belong to the group of regions most impacted by transition. The structural analysis method setting up chorems is used to represent and help to understand spatial organisation and developmental possibilities and limits of the studied districts.*

Key words: *regional development, regional system, choremetics, spatial model, Eastern Slovakia.*

INTRODUCTION

Research of regional systems as structured multidimensional spaces defined by varied classes of relationships and processes acquires varied forms when holistic approach is applied. If diagnostic approach to research of material (natural and socio-economic) spatial structures prevailed so far in geography, now it also includes the research of substance-energetic exchange, social, capital and information relationships and processes regarding their economic, social and cultural identity, regionalism, position in hierarchy of spatial systems and sustainability of their development. An adequate use of knowledge and science in its post-modern interpretation (Paulov 1997, Lehotský 2003), i.e. as the science that expands its traditional elements, facts and actors of scientific community, science conceiving the new integral level of practice leads to its democratisation and communicativeness.

This paper has been conceived in a similar spirit. Its aim is to outline the model characteristics of spatial organization of regional systems, to characterise briefly regional development and problems of regional development in the SR from the geographical point of view, to identify factors affecting regional differentiation and to characterize regional systems in terms of developmental possibilities and limitations using the example of two model territories (the former districts Rimavská Sobota a Bardejov) applying the method of graphic models.

MODELS OF SPATIAL ORGANIZATION OF REGIONAL SYSTEMS

Regional system is the reflection of existing and developing socio-economic processes and of characteristics proper to natural structures including the value relationship between humans and the environment. It is a very complex and multidimensional picture of region covering the economic, social and natural elements in their interaction. It changes along

1 **Doc. RNDr. Vladimír Ira, CSc.,**

*Institute of Geography, Slovak Academy of Sciences, 814 73 Bratislava,
Štefánikova 49, e-mail: geogira@savba.sk*

2 **RNDr. Milan Lehotský, CSc.,**

*Institute of Geography, Slovak Academy of Sciences, 814 73 Bratislava,
Štefánikova 49, e-mail: geogleho@savba.sk*

with differentiation of its material substance and time. Its present state determines the future state.

The graphic model of regional system represents the picture of geographical reality, its spatial structure, which has been compiled by logical process i.e. visualisation of regional system. Axiomatic basis of graphic modelling is the hypothesis that all points of space belong to certain fields that structure the space. If so, then every type of structure can be defined by static and dynamic properties both in temporal and spatial dimensions while the expression is graphic. The basic, dual elements of the graphic models, i.e. both elementary construction elements and the graphically visualised expressions of structures are called chorems. After Brunet (1980) and Brunet and Dolfus (1990), their compilation, hence the description of reality depends on eight basic features by which the regional systems are "exhumed". Features of areas make it possible to delimit the explored area – region in form of a square, circle and hexagon harmonizing their symbolism with reality of the region but also symmetry or asymmetry, the interior, sub-whole, etc. A point defines strictly the location, place. A line represents the link but also separation or breach and can capture the aspect of symmetry or asymmetry. Flows always express asymmetry but their bulkiness and rate can differ. Transition represents the openness, but also its development and grade of closeness can be expressed. Signs "+" and "-" or "→" express increase or decay and decrease, attraction or repulsion. A gradient can represent varied types of fields and surfaces with varied value, quality, intensity, etc. Their logical combinations result in the basic system of chorems, which analyses and represents spatial geographical phenomena, regional structures as points, lines, areas, and networks taking into account quasi generally valid laws controlling their formation, such as aspects of space fragmentation, location, diffusion, gravitation, and the like.

Combination of chorems based on the above-said, will reach both simpler and more complex capture and representation of basic laws controlling spatial organization of regional system and the potential of its further development, and eventually to compilation of its graphic model. Graphic model can, due to the logical matrix combination of chorems and basic features and thanks to the compromise between capture of the substance by simple form and less precise non-map representation of certain states of reality, grasp practically all aspect of the regional system (Lehotský 1998).

REGIONAL DEVELOPMENT OF THE SR IN GEOGRAPHICAL TERMS

In time of transiting society, the issue of regional development and factors, which condition development, or decay of regions and the origin of regional disparities have become a subject of interest of varied scientific disciplines including geography. Causes of this increased interest in regional (geographic) structuring of social development are connected above all with practical questions of territorial differentiation, i.e. particular problems of regions but also with wider interest in development or knowledge of progress made in socio-scientific disciplines (Hampel 2001).

The interest in issues of regional development in Slovakia has also manifested in some governmental measures in favour of the differentiated development in the period between the First and Second World Wars. The socialist State policy in after war period focused on balancing of economic development and living standards in individual regions of the country and above all on neutralizing the economic gap existing between Slovakia and Czechia.

Insufficient or absent regional policy in the first years of transformation (1990-1998) manifested in increasing regional disparities and in formation of marginal regions. Studies dealing with regional development issues often report that Slovakia is divided into two macroregions – the rich north-western and poor south-eastern (see for instance Pašiak et al. 2001, Gajdoš 2002, Korec 2005). Pašiak et al. (2001) classified districts of the south-Slovakian basin or the southern part of the mountains Slovenské Rudohorie among the most underdeveloped ones while district Rimavská Sobota was tagged problematic. Another compact area with considerable problematic parts is the north-eastern part of Slovakia (including district Bardejov). Hence, the two selected model districts of the east-Slovakian region represent marginal areas.

FACTORS OF REGIONAL DIFFERENTIATION

Transition changes spurred (at least temporarily) increase of regional differentiation of Slovakia. The levelled up situation in regions during the socialism was not altogether natural. This is the reason why increased disparities between regions can be interpreted as a natural process perhaps unavoidable in economic terms. Some regions of Slovakia have coped with transition successfully; others suffer from economic or social tensions. Factors determining the differentiated development in regions are numerous. Based on knowledge drawn from studies about regional development of Slovakia after 1989 (Gajdoš 2004, Ira et al. 2005 and above all Korec 2005), and from other relevant to the theme (Lukniš 1985, Bezák 2000), developmental chances and limits of two model regions have been assessed by the following aspects: the primary or situational potential, territorial-administrative division, settlement hierarchy activities within the macro position, character of settlement, specific features of demographic structure, “big” transport infrastructure, historical marginality, economic specialization, rate of depression of contiguous cross-border countries, action capacity of self-administration and the environment.

Charakteristics of model regional systems (former districts Bardejov and Rimavská Sobota) – estimation of developmental possibilities and limits

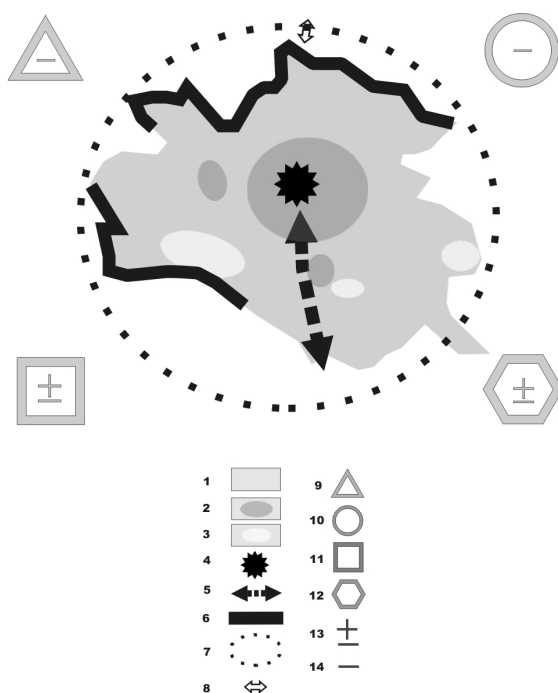
Models of selected regional systems (districts) like for instance in work of Brunet et al. (1989) and Lehotský et al. (1993) are constructed with the concept of what is referred to as elementary models – chorems which schematically reflect the specific features and uniqueness of spatial organization.

Areas in the models of selected districts are the territories with favourable and unfavourable values of human potential and settlement conditions, territories with important agriculture and nature protection. Point symbols represent important and less important settlement centres or border crossings. Line symbols stand for: the 1st level developmental axis – main developmental axis of Slovakia, the 2nd level developmental axis, natural barrier and the boundary of the functional region. Developmental chances in economy, demography, action capacity of self-administration and infrastructure with the corresponding importance level are quoted in margins of graphic models (Fig. 1, Fig. 2).

District Bardejov (Fig. 1) is one of geographically marginal regions in the northern part of eastern Slovakia. Its position potential is low. Natural barriers in the northern and western parts of the districts are its developmental limits. Insufficient linkages to “big” transport infrastructure accompany it. Regarding the number of communes (86), it is the

second most important district of the administrative region. Rate of urbanization (43.9%) though, is lower than the regional average and far below the national average. The town of Bardejov represents an important centre. No other centre as a carrier of developmental acceleration above all of tertiary or quaternary activities exists in the area. Developmental possibilities concerning the action capacity of self-administration are average. The factor of the environmental situation is relatively favourable. The delimited district and functional urban region are almost identical. Disharmony in terms of regional structure is acceptable – the territorial harmony index is higher than 90% (Bezák 2000).

Fig. 1: *Model of developmental possibilities and limits for district Bardejov*



1. District territory
2. Territory with favourable values of human potential and settlement conditions
3. Territory with adverse values of human potential and settlement conditions
4. Important settlements
5. Developmental axis of the 2nd level
6. Natural barrier
7. Boundary of functional urban region
8. Border crossings
9. Possibilities of economic development
10. Developmental possibilities in terms of human potential and social situation
11. Developmental possibilities in terms of action capacity of self-administration
12. Developmental possibilities in terms of infrastructure
13. Average possibilities of development
14. Limited possibilities of development

District Rimavská Sobota (Fig. 2) is part of the south-Slovakian (single axis) corridor region (SSCR). The core space of SSCR is the 10-25 km wide flat south-Slovakian basin. The hilly surface of the basin is easy to transit (far-distance pipelines and conduits of oil, gas, electricity, etc.) The district boasts remarkable mineral resources. The effect of the west-east gradient is the result of the long distance from the western borders of the country.

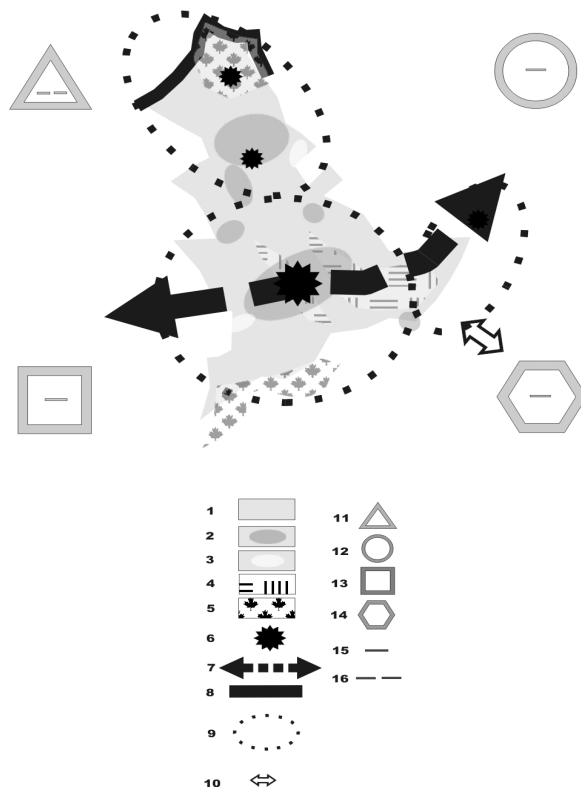
Essentially, the district consists of two independent functional urban regions (FUR). Apart from two FURs (Rimavská Sobota and Hnúšťa) there is also the peripheral area of the third FUR (Tornaľa). The district is closed from the exterior but as far as its interior is concerned, it is an incoherent territorial unit (Bezák 2000). There are three towns but their size is insignificant and the rate of urbanization is low (44.2% of urban population), what manifests in insufficient attractiveness for non-production sector entities. The most important limitations include the low value of human potential and adverse social situation of population.

CONCLUSION

Analysis of several model territories and its results demonstrate that the distinct regional disparities characterize the present state of socio-cultural and socio-economic situation in Slovakia (Gajdoš 2004, Ira et al. 2005, Korec 2005). Developed regions (with prevailingly significant representation of urban structures) formed on the one side while on the other there are less developed regions (two of them were subjects of this study) where the synergic effect of several factors is unfavourable. They are areas with unfavourable parameters of situation potential, poor linkage to “big” transport infrastructure with higher share of unemployed, poorly developed and diversified economic structure, low educational level of population (district Rimavská Sobota), and the like.

The study of model regions pointed to the need to analyse the key chances and limitations of development and the need to assess it scientifically. In this way, prerequisites for the preparation of an efficient regional policy necessary for the solution of the unfavourable differentiation in Slovakia and elaboration of quality regional policies at the lower hierarchic level are created.

Spatial graphic models also offer the chance of identifying the developmental possibilities and limitations of regional systems based on the key factors of regional development. The significance of graphic modelling is in identification of the unique and specific features of spatial structure of a region. A non-transitive model makes it possible to compare similar types of spaces. Graphic models also represent a very rapid, visualised and clear form of communication both in the field of scientific learning and application in territorial or regional planning. But it should be also noted that the graphic map schemes are not simplified schemes of maps, they detect the spatial organization of regional systems by a logical visualised form.

Fig. 2: *Model of developmental possibilities and limits for district Rimavská Sobota*

1. District territory
2. Territory with favourable values of human potential and settlement conditions
3. Territory with adverse values of human potential and settlement conditions
4. Territory important in terms of agriculture
5. Territory important in terms of nature protection
6. Important settlements
7. Developmental axis of the 1st level the main developmental axis of Slovakia
8. Natural barrier
9. Boundary of functional urban region
10. Important and less important border crossing
11. Possibilities of economic development
12. Developmental possibilities in terms of human potential and social situation
13. Developmental possibilities in terms of action capacity of self-administration
14. Developmental possibilities in terms of infrastructure
15. Limited possibilities of development
16. Distinctly limited possibilities of development

Acknowledgement: The paper was prepared under the Project No. 6042 financially supported by the VEGA Grant Agency and the RD task "Regional Differentiation, Regional Development in the Slovak Republic in the Context of Integration Impacts" No. 2003SP 51/028 0600/02806 02-2003.

References

- BEZÁK, A. (2000): Funkčné mestské regióny na Slovensku. *Geographia Slovaca*, 15, 1-89.
- BRUNET, R., (1980): La composition des modèles dans l'analyse spatiale. *L'Espace géographique*, 4, 253-265.
- BRUNET, R., DOLFUS, O. (1990): *Mondes nouveaux*. Hachette/Reclus, Paris, 551 s.
- BRUNET, R., LEHOTSKÝ, M., PODOLÁK, P. (1989): Geografický model regionálneho systému – príklad Východolsovenskej nížiny. *Architektúra a Urbanizmus*, 23, 139-146.
- GAJDOŠ, P. (2002): Človek Spoločnosť Prostredie. Priestorová sociológia. Sociologický ústav SAV, Bratislava, 379 s.
- GAJDOŠ, P. (2004): Typológia regionálnej diferenciácie SR, In Falt'an, Ľ., Pašiak J., eds. *Regionálny rozvoj Slovenska – východiská a súčasný stav*. Sociologický ústav Slovenskej akadémie vied, Bratislava., s. 54-78.
- HAMPL, M. (2001): Teorie regionálního vývoje: principy a /anebo problémy. In Hampl, M. a kol: *Regionální vývoj: specifika české transformace, evropská transformace a obecná teorie*. DemoArt, Praha, s. 17-41.
- IRA, V., PAŠIAK, J., FALŤAN, Ľ., GAJDOŠ, P., eds. *Podoby regionálnych odlišností na Slovensku (príklady vybraných okresov)*. Sociologický ústav SAV, Bratislava, 381 s.
- KOREC, P. (2005): Regionálny rozvoj Slovenska po roku 1989 (identifikácia menej rozvinutých regiónov Slovenska). *GeoGrafika*, Bratislava, 227 s.
- LEHOTSKÝ, M. (1998): Chorematic model and perception of the cultural landscape. In Miklós, L. ed.: *Evaluation and perception of landscape patterns. Proceedings from 3rd International Conference on Culture and Environment*. UNESCO-Chair for ecological awareness. Banská Štiavnica. s. 93-100.
- LEHOTSKÝ, M. (2003): Postmoderna a epistemológia krajinného priestoru s akcentom na fluvialne geosystémy. In Herber, V. ed.: *Fyzickogeografický zborník 1. Fyzická geografia – vzdelávanie, výskum, aplikácie*. Přírodovedecká fakulta MU v Brne, Brno, s. 146-151.
- LEHOTSKÝ, M., PODOLÁK, P., SZÉKELY, V. (1993): Modèle d'un système régional: Spis en Slovaquie. *L'Espace géographique*, 2, 125-132.
- LUKNIŠ, M. (1985): Regionálne členenie Slovenskej socialistickej republiky z hľadiska jej racionálneho rozvoja. *Geografický časopis*, 37, 137-163.
- PAŠIAK, J., GAJDOŠ, P., FALŤAN, Ľ. (2001): Regional Patterns in Slovak Development. In Gorzelak, G., Ehrlich, E., Falt'an, Ľ., Illner, M., eds., *Central Europe in Transition.: Towards EU Membership*. Scholar, Warszawa, s. 330-363.
- PAULOV, J. (1997): Postmodern Geography: A Brief Characterization. *Acta Universitatis Carolinae, Geographica, Supplementum*, s. 45-50.

MODELY ROZVOJOVÝCH MOŽNOSTÍ A OBMEDZENÍ VYBRANÝCH REGIONÁLNÝCH SYSTÉMOV

Zhrnutie

Výskum regionálnych systémov ako štrukturalizovaných multidimenzionálnych priestorov definovaných rôznymi druhmi vzťahov a procesov má pri aplikácii holistického prístupu rôzne podoby a polohy. Vklad adekvátneho využívania vedeckých poznatkov a vedy v jej postmodernom chápaní, t. j. ako vedy rozširujúcej tradičné prvky vedeckej praxe, faktov i účastníkov vedeckej komunity, vedy koncipujúcej novú integrálnu úroveň poznávacej praxe vedie ku komunikatívnosti, čím sa približujú ňou získané výsledky viac k „človeku“.

V tomto duchu je koncipovaný aj nesledujúci príspevok. Jeho cieľom je načrtnúť charakteristiku modelov priestorovej organizácie regionálnych systémov, stručne charakterizovať problematiku regionálneho rozvoja z hľadiska geografie a problémy regionálneho rozvoja SR, identifikovať faktory ovplyvňujúce rozvoj regiónov a na príklade dvoch modelových území (bývalé okresy Rimavská Sobota a Bardejov) charakterizovať prostredníctvom grafických modelov regionálne systémy z hľadiska rozvojových možností a obmedzení.

Grafický model regionálneho systému predstavuje obraz geografickej reality, priestorovej štruktúry, ktorý je zostavený logickým procesom vizualizácie regionálneho systému. Základné, duálne chápané prvky grafického modelu, t. j. ako elementárne konštrukčné prvky i ako grafické vizualizované vyjadrenia priestorovej štruktúry sa nazývajú chorémy. Na ich zostavenie a tým aj postihnutie reality slúži podľa Bruneta (1980) a Bruneta a Dolfusa (1990) osem základných znakov, prostredníctvom ktorých „exhumujeme“ regionálny systém.

Kombináciou chorém dospievame k jednoduchšiemu i zložitejšiemu postihnutiu a zobrazeniu základných zákonov priestorovej organizácie regionálneho systému a potenciálu jeho ďalšieho rozvoja, k tvorbe jeho grafického modelu. Grafickým modelom je, vďaka logickému maticovému kombinovaniu chorém a základných znakov a vďaka kompromisu medzi vystihnutím podstatného jednoduchou formou a menej presným, nemapovým postihnutím určitých stavov reality, možné postihnúť prakticky všetky aspekty regionálneho systému (Lehotský 1998).

Problematika regionálneho rozvoja a faktorov, ktoré ovplyvňujú rozvoj či úpadok regiónov a vznik regionálnych nerovností sa stali v období transformačných zmien spoločnosti predmetom záujmu viacerých vedných disciplín, vrátane geografie. Príčiny narastajúceho záujmu o regionálnu (geografickú) štruktúru spoločenského vývoja sa spájajú predovšetkým s praktickými otázkami územnej diferenciácie, to znamená praktickými problémami regiónov, ale aj so širším záujmom o otázky rozvoja, resp. so záujmom o rozvoj poznania v sociálno-vedných disciplínach (Hampl 2001).

V prvých rokoch transformácie (1990-1998) sa začala prejavovať v narastaní regionálnych disparít a vo formovaní depresných (marginálnych) regiónov. Vo viacerých prácach venovaných otázkam regionálneho rozvoja sa stretávame s názorom, že Slovensko je z hľadiska členenia regionálnej štruktúry rozdelené na dva „makroregióny“ – bohatý západný, resp. severozápadný a chudobný východný, resp. juhovýchodný. Pašiak et al.

(2001) zaraďujú medzi najviac zaostané regióny územia okresov Juhoslovenskej kotliny, resp. južnej časti Slovenského Rudohoria (okres Rimavská Sobota bol klasifikovaný ako problematický). Druhou územne kompaktnou oblasťou so značne a výrazne problematickými teritóriami je severovýchodná časť Slovenska (medzi nimi aj okres Bardejov). Z uvedeného je zrejmé, že dva vybrané modelové okresy východoslovenského regiónu predstavujú územia zaujímavé z hľadiska marginality.

Rozvojové možnosti a obmedzenia dvoch modelových regiónov boli hodnotené na základe viacerých faktorov (primárneho/polohového potenciálu, územno-správneho členenia, sídelnej hierarchie, makropolohovej atraktivity, charakteru osídlenia, osobitostí demografických štruktúr, „veľkej“ dopravnej infraštruktúry, historickej marginality, ekonomickej špecializácie regiónov, depresnosti priľahlých regiónov susedných štátov, akčnosti samosprávy a faktor environmentálnej situácie).

Modely vybraných regionálnych systémov (okresov) podobne ako napr. v prácach Bruneta et al. (1989) a Lehotského et al. (1993) sú konštruované na základe koncepcie tzv. elementárnych modelov – chorém, ktoré schematickým spôsobom odzrkadľujú zvláštnosti a jedinečnosť priestorovej organizácie. V rámci modelov vybraných okresov, sú areálmi vyznačené územia s priaznivými a nepriaznivými hodnotami ľudského potenciálu a sídelných podmienok, územia významné z hľadiska poľnohospodárstva a ochrany prírody. Bodovými symbolmi sú vyjadrené významné a menej významné centrá osídlenia a významné a menej významné hraničné priechody. Líniovými symbolmi sú vyjadrené: rozvojové osi, prírodné bariéry a hranice funkčných regiónov. Po okrajoch grafických modelov sú značkami naznačené rozvojové možnosti z hľadiska ekonomického, demografického, z hľadiska akčnosti samosprávy a rozvojové možnosti z hľadiska infraštruktúry s príslušným označením stupňa významnosti.

Výsledky analýz modelových regiónov dokumentujú, že okr. Bardejov sa zaraďuje medzi o územia s nepriaznivými parametrami polohového potenciálu, s nedostatočnou nadväznosťou na „veľkú“ dopravnú infraštruktúru, s vyšším podielom obyvateľov žijúcich vo vidieckych sídlach a okr. Rimavská Sobota medzi regióny s rastúcim podielom nezamestnaných slabo rozvinutou a málo diverzifikovanou ekonomickou štruktúrou, nižšou vzdelanostnou úrovňou obyvateľstva a pod.

Štúdium modelových regiónov poukázalo na potrebu analýzy kľúčových možností a obmedzení rozvoja a potrebu vedeckého zhodnotenia tohto stavu. Vytvárajú sa tak predpoklady pre vypracovanie efektívnej regionálnej politiky na riešenie nepriaznivého stavu regionálnej diferenciácie na Slovensku, ale aj predpoklady pre vypracovanie kvalitných regionálnych politík na nižšej hierarchickej úrovni.

Význam grafického modelovania tkvie v identifikácii jedinečnosti a špecifičnosti priestorovej štruktúry regiónu. Vyjadrením je netransitívny model, ktorý umožňuje porovnanie podobných typov priestorov. Grafické modely predstavujú súčasne veľmi rýchlu, vizualizovanú a jasne zrozumiteľnú formu komunikácie, či už v oblasti vedeckého poznávania, aplikácii v územnom a regionálnom plánovaní, apod. Súčasne je však potrebné podotknúť, že grafické modely nie sú zjednodušené schémy máp, naopak detekujú priestorovú organizáciu regionálnych systémov logickou vizualizovanou formou.

Recenzovali: Prof. RNDr. Eva Michaeli, PhD.

Prof. RNDr. René Matlovič, PhD.

INNER GEOPOLITICS AND ITS MEANING FOR QUEST OF OPTIMAL SPATIAL-POLITICAL STRUCTURE OF RUSSIA – SELECTED ASPECTS

Robert IŠTOK¹

Abstract: *The internal aspect of geopolitics having an important influence on state was, in geopolitical thinking, marginalised in recent years. Referring to state, regional and local dimension of geopolitical thinking it is advisable to use the term of inner geopolitics. Nowadays, the meaning of inner geopolitics in considerations about future of Russia is being emphasised. The article reflects these tendencies.*

Key words: *inner geopolitics, spatial-political structure, regional structure, Russia.*

INTRODUCTION

Currently, the term of geopolitics is very often used in many modifications and in a wide semantic scope. Despite it, the meaning of geopolitical thinking for political practice has not yet been sufficiently appreciated. It is due to its problematic development and insufficient elaboration of theoretical base of geopolitics. The typical reflection is a discussion on system of scientific thinking and the place of geopolitics in it. Geopolitics is then characterised as a science, theory, conception, doctrine, stream of thinking etc.

Regarding to state, the geopolitics is understood as a study of state and its position in international space, a doctrine of its foreign policy and its realisation. M. I. Glassner (1996) considers geopolitics as an application of geographical information and geographical perspective in the process of formulating and realising the foreign politics of states. In his view, the geopolitics is connected with the process of division of world space amidst various geopolitical subjects emphasising the international dimension. The internal aspect of geopolitics having an important influence on state as a subject of international relations was, in geopolitical thinking, marginalised in recent years.

In geopolitical thinking (similarly in political geography) it is possible to distinguish four spatial scales – global geopolitics (actors being significant international organisations and global powers seeking to solve global problems, peace, power hegemony), macroregional (suprastate) geopolitics (the chief actors being regional international organisations, regional international organisations, regional powers and big religious communities), state geopolitics (the actors being national states, it deals with the problems of separatism, regionalism and the like). The regional and local (substate) geopolitics the actors of which are regions within states, minorities, cities and communities seeks to solve the problems of international transport sovereignty, democratic proportion on power in state, subsidiary. Referring to state, but mainly to regional and local dimension of geopolitical thinking it is advisable to use the term of inner geopolitics.

1 **Prof. RNDr. Robert Ištók, 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: istok@unipo.sk*

THEORETICAL ASPECTS OF INNER GEOPOLITICS

The significance increase of regions and localities is bound to decentralisation of competencies from the state organs to regions and local governments. It is reflected in higher interest in geopolitical analyses of inner state actors in regional and local scale. State as the most significant international geopolitical actor has to cater for the spatial-political functioning, with the aim to achieve the highest possible degree of inner stability.

In this context the geographical approach is inseparable. Political geography acts an important information source because it explores spatial conditioning of political processes inside the state. It also influences geopolitical thinking which strives to give the complex view on as a spatial-political structure. The structure consisting of regions and localities of various hierarchical degrees should undergo the in-depth analyses.

States usually constitute the national interests, distinctly influenced by geopolitical factors. Geopolitics in its „classical“ form is distinctly connected with realisation of geopolitical goal of particular subject (state) in practice. It answers the questions what is necessary to do to fulfil the goal.

Development of inner geopolitics is the reflection of effort to exploit the knowledge of patterns on how the globalised world is working and how the role of state is changing. In new global situation particular inner state regions and localities play increasingly important role. Geopolitical activities are of new forms, new subjects are being initiated and more and more people are dragged in. The process is reflected in an array of conflicts, in power-political rivalry, and the fight for various political or cultural values. This process exists from the global to local scales.

The new approach to geopolitics emphasising the inner spatial-political state structure has developed in France, the USA, the UK, the states of Latin America in recent years. The spatial scale of geopolitical thinking was given name „inner geopolitics“ (*la géopolitique interne, vnutreynaya geopolitika*). It was a turning point in geopolitical thinking and might be considered as broadening the horizons for its further development. We can talk about „deglobalisation“ of geopolitics, creating new opportunities to use the geopolitical approach in substate scale.

Inner geopolitics is understood as a part of innovative geopolitical school named new geopolitics. Contrary to „classical“ geopolitics aimed at natural environment factors, it considers human factors dominant (demographical, economic, sociological). It works with all from local to global hierarchical degrees. As written by Ó. Tuathial (1996) the understanding of spatialisation in terms of spatial organisation has spread from global scale to substate scale in geopolitical thinking.

Inner geopolitics can be viewed as an applied direction of geopolitical thinking. it is meant as power-political analysis useful for understanding the relations of regions within and in relation to state. A wide understanding of inner geopolitics enables to compose wide spectrum of geopolitical analyses on condition of considering the inner state spatial dimensions. Inner geopolitics includes following problems:

- constituting and working of spatial-political state organisation (comprising political division, territorial-administrative division, electoral districts and the like),
- spatial distribution of political powers inside the state,
- regional planning and regional politics,

- interregional relations (centre - periphery)
- role of minorities

Geopolitical analyses connected with states are inevitable to consider their inner stability. It is necessary that antagonistic powers undergo the process of geopolitical analysis bound to goals of particular political powers. There might be either centripetal tendencies (aiming to unify and reinforce the state) or centrifugal tendencies (eroding the unity). The analysis may include wide spectrum of approaches to this issue. The influence of outer geopolitical factors on state stability taken from classical geopolitics cannot be left out.

Inner geopolitics has been primarily developed in France. Systematic development is currently connected to works of French geographer Y. Lacoste. He stemmed from the traditions of French geopolitical thinking of A. Siegfried researching the successfulness of ideas of political parties and movements in context of regional structure of France. Inner geopolitics is reflected in many works analysing territorial-administrative units of France (from regions, départements to cities). In them, geopolitics is understood and connected with a wide range of spheres, segments and activities, manifesting all human and social activities (Tomeš 2000).

INTERNAL GEOPOLITICS OF RUSSIA IN CONTEXT OF GEOPOLITICAL SITUATION AFTER 1991

Nowadays, the meaning of inner geopolitics in intellectual considerations about future of Russia is being emphasised. Many Russian thinkers focus on the fact that geopolitical analysis of current (and future) situation of state is characterised for inner geopolitics. Territorial dimensions of state as well as a transformation of geopolitical thinking after the year 1991 have accented the meaning of geopolitical analyses. The goal is to assess the current situation and quest of alternatives to achieve the inner stability of Russia as a primary condition for return of great power. As written by M. Galeotti (1998), Russia had to first cope with itself and its geopolitical position. This position was, at the end of the 20th century, considerably weakened.

The balance of geopolitical loss of Russia after the USSR break-up was a warning (Bejdina 2006). Russia viewed it as a loss of more than five millions km sq. of „its“ territory. Russia lost important access to not freezing seas in the Baltic and Black seas. The whole territory was drifting northwards and eastwards. Their new neighbours were politically and economically weaker, not very vital states considered as „near abroad“, belonging to interest sphere of Russia, but at the same time threatening Russia's stability.

Dynamic development of geopolitical thinking in Russia is understood as a natural phenomenon. After the break-up of the USSR it is necessary to return self-confidence and hope to frustrated Russian society and the position of Russian state stemming from historical traditions, army forces, natural and human resources, and territorial expansion. In this context it may be stressed that the pride on territory is one of the main parts of Russian pride and one of the last motivations (Besancon 2001).

Geopolitical thinking, enabling to formulate wide scope of conclusions has become one of appropriate tools to reinforce the Russian self-confidence. The intriguing is a conception of „the island of Russia“ formulated by V. L. Cymburskij. In his view, it is necessary to

concentrate the attention of Russian intelligence to own, inner problems in philosophical context addressing Russia as a self-sufficient „third Rome“. Geopolitics emanating from this thesis is called „island“, however, it should not mean to close and isolate itself.

In this context, many Russian authors are seeking inspirations for giving reasons for global irreplaceability of large Russian state in „classical geopolitics“. The emphasised are global geopolitical position of Russia as Heartland, geographical axis of history, coming from the intellectual heritage of H. Mackinder (f. ex. Iljin 2001). The necessity of Russian state unity is interpreted as a condition of Euroasia stability preservation, and as H. Mackinder adds – the world island and the whole world as well. As written by Krivov and J. Krupnov (2006), in Russian geopolitical thinking the inner geopolitics must be dominant. Practical task of outer geopolitics in Russia will be to secure the support of world community for Russian inner geopolitics in order to stabilise the world system.

Geopolitical analysis of Russia has to stem from many specific premises. The stressed are characteristic traits of Russian state being:

1. Centralised and state-governed economy that should have secured colossal army forces.
2. Strict authoritative, totalitarian political system, connected with mesianistic ideology which was in charge of managing such economy with support of enormous army forces.
3. Building an empire, large territorial and political expansion. The enlargement gave rise to new vulnerable spots, what stimulated further expansion.
4. Incessant confrontation with outer world as a result of previous characteristics, which excused Russian's political system and all its specifications (Michal'jov 1999).

After 1991, the inner geopolitics of Russia sought to emphasise the factors unifying Russia, exploiting geography, history, the combination of both. The analysis of mosaic character of Russian country refers to establishment of many „local“ or „regional“ statehoods in the period of the Middle Ages. After liberation from Tatar rule the natural process of „collecting“ of Russian countries had been carried out. This process had not been stopped on boundaries of Russian settlements, but logically continued northwards and eastwards. The Russian colonisation created the regions of „free and enterprising people“, whereas the enlargement westwards and southwards meant spatial connection to new European or old Asian (Near East) history (Iljin 2001).

The break-up of the USSR as a last form of Russian empire was a step back. In relation to current Russia, it is necessary to highlight that the process of territory disintegration was conducted not only at the level of federative republics but also at the level of subjects of Russian federation. Both processes were interwoven and influencing mutually on the territory of the USSR (Kotyk 1998). Russia was, therefore, much more endangered than the rest of former federative republics.

One of the reasons of this phenomenon is in terms of inner geopolitics the ignorance of natural geopolitical division of Russia after the victory of Bolsheviks. It regarded with delimitation of new quasi-autonomous administrative-territorial units, leaning on ethnical structure of the country. Such deformations started to manifest their destructive potential during the USSR crisis. The contradictions have preserved up to the present as subjects of the Russian federation.

It is without doubt that after the decay of the USSR, Russia found itself in dangerous situation, with possible second break-up. The relations between Moscow and some regions (Tatarstan, Baskhortostan, Chechnya) got complicated, even explosive. The effort to achieve certain rate of independence on centre hit all Russian regions, but with different intensity.

The centre sought to solve the danger of disintegration by formulating the Federal agreement signed by all regions on 31st March, 1992. Passing the Constitution on 12th December, 1993 had become a completion of legislative processes. Federal agreement as well as constitution had stabilised asymmetric character of federation fostered by regional state structure.

Individual regions are distinctly specific and heterogeneous in terms of inner development, population structure as well as the situation of transformation processes development. In this view, Russia is a very unique state unit (Kotyk 1998). Asymmetry of Russian federal model caused considerable inner problems resulted in unsuccessful attempts of some Russian federal subjects (regions) to gain the status of republic (the Sverdlovsk area aimed to entrench as Urals federal district).

Nowadays, Russia is administratively divided into 21 republics, 7 territories (krais), 46 provinces (oblasts), 1 autonomous province (autonomous oblast), 4 autonomous districts (autonomous okrugs) and 2 federal cities. According to V. A. Kolosov and N. S. Mironenko (2001) the division has many shortcomings. It is complicated from the point of view of hierarchical structure, individual subjects of same levels are not equal, moreover, it is excessively disintegrated.

It is necessary to note that in a relatively short time after the USSR break-up the regional elites had taken up and individual regions were in a role of real actors of political and economical power. Astounding is the elites did not initiate the elaboration of such strategies between centre and regions which would fit new situation. The coherent conception of regionalism has long absented in Russia. Instead of it, there was „a kind of“ administrative pyramid with Moscow on the top, and the below hierarchy with „small Moscows“.

The situation got worse due to economic discrepancies within the federation subjects crating the heterogeneous mosaic of regions. The complex knot of mutual contradictions grounded on the disputes between self-sufficient and subsidized regions. The confidence of rich regions manifested and still manifest in effort to gain the highest possible degree of political and economic autonomy. The poor regions, subsidised from centre cannot afford such approach.

The creation of seven federal districts (federal okrugs) by Russian president of 13th May, 2000 is understood disputably from the regions' side. On the one hand it is considered as a step against disintegration trends, on the other hand, it is viewed as a prerequisite for relationships development among regions. Neither V. Putin was courageous to conduct a radical change in administrative arrangement of Russia. Delimitation of seven federal districts stems from inner borders demarcated during the reign of J. V. Stalin. It is likely that the principal of known badness rather than something new, for it may destruct everything, was exploited. This kind of dilemma is typical of all Russian history (Galeotti 1998).

Analyses of inner Russian geopolitics are logically aimed at identification of real geopolitical structure of Russia in new conditions. It is based on natural nodes delimitation

(having different hierarchical level) and peripheries. Many geopolitical factors are taking into account: location, population density, ethnic structure, or infrastructure. Special attention is paid to position of extra sensitive macroregions such as the Volga basin area, Ural, Siberia and Far East. This trend was fostered by change of Russian state which moved eastwards and northwards. The geopolitical focus moved as well.

It is showed that inner geopolitics of Russia is rather indefinite (Iljin 1998), therefore, it should be put on the table by Russian thinkers. It is also showed that in case of Russia it is not possible to strictly separate inner and outer geopolitics. As written by V. Serebrjannikov „geopolitics is starting from the inner geopolitical space. Principally, geopolitical space of Russian has to be explored in unity of inner and outer components, by means of inner and outer interests“. So the analyses of inner geopolitics of Russia must be unconditionally subordinated by outer interests the primary of which is a renewal of position of Russia as a global geopolitical actor.

It is necessary to note analyses of current Russian geopolitical situation highlight the idea (f. ex. J. L. Pivovarov 1992) that despite the enormous territory, mosaic, population differences, economy and nature, Russia is a synthetic world comprising many nations, cultures and religions. It is „a boiler in which a new community had been smelting“. The emphasis is put on other positive features of Russian history which are to reinforce the self-confidence of the Russians. For example, it was right Russian nation which constituted the only Euroasian state, unified all nations to „Euroasian brotherhood“ and formed „Euroasian superetnical system“ (Geopolitika i bezopasnost' Rossii... 2006). Another thing is the role of Russia as a protector of Europe from Islamic fundamentalism.

Such ideas are meant to support the optimistic approach in searching solution for the renewal of Russian largeness. They declare nothing is lost and assume after the period of crisis the return of Russia will come without doubt.

WHAT TO DO?

The title of N. G. Černyševsky's work piece reflects the dilemma of Russian thinking. The quest for direction of Russian state was problematic – it did not find spiritual route to Europe neither it was considered a part of Asia. The issue is still topical and refers to quest for Russian own inner and outer revival. Russian dilemma is a constant part of Russian geopolitical thinking the aim of which is to find a model to stabilise the Russian state. In our paper only some conceptions displaying the trends of current Russian geopolitics are mentioned.

The problem of the centre – periphery relationship had become a centre of attention after the sovereignty proclamation in June 1990. It may be said this situation gave rise to development of geopolitical thinking of Russia in its inner dimension. It resulted in a fruitful discussion seeking to find a solution leading to stabilisation of Russian state.

Many authors pointed out the necessity of territorial-administrative division of Russia to be revised. The reason is the high number of federation subjects, considerable differences in terms of area, number of inhabitants, source and economical potential. The criticism focuses on the contradiction – according to constitution they are equal, however, they have different status.

The next phenomenon specific for Russia is that some subjects of federation are part of other subjects (all autonomous districts apart from the Chukotka autonomous district are

within oblasts or regions), what leads to many contradictions and competencies problems. Around 30 territorial disputes within federation subjects are another problem (Šul'gina 2005). All circumstances negatively affect the effectiveness of management, inner coherence as well as political state stability. Russia has to search for the way to achieve the unity and territorial coherence and to secure the regions' autonomy as well.

To a large extent the ideas of Russian nationalism are implementing. M. Nazarov (2004) suggests eliminating the fictional national units in which the titular nation is in minority and „discriminates the other citizens“. He adds the current federative arrangement and national structure of the state government bodies (members of parliament of ethnic minorities accounting for 36% of the Council of Federation), offend the rights of Russian nation. In spite of artificial national units it would be more just to provide the minorities with „allrussian culture autonomy independently of their place of living“.

The very similar is presented by A. V. Mitrofanov (1997) who claims the Russians are obliged to promote „the national egoism“ because it is the only principal solving their dilemma to choose between „the life and death“. If implemented it would mean disposal of all „national sovereignties“ apart from the sovereignty of Russian nation. This is, in his view, the way to secure the Russian state and to advancement of all nations living on Russian territory. Russia could restore the administrative division in a form of gubernya since the reign of Catherine II.

Over the 90ties of the last century many politicians promoted to create the new administrative division of the country (f. ex. G. Javlinskij, A. Tulajev). This issue was and still is a research object of official institutions. F. ex. the Council for Productive Powers Study submitted proposal for Russia to become the unitary state divided into 7 districts and 28 gubernyas (Skokan 2005). It can be presently seen that the question of new administrative arrangement of Russia means that plenty of unsolved problems are being unfreezed. As mentioned above, the government of V. Putin could not afford to do it and thus, introduced the integration of federative subjects into 7 federative districts. Russia, as indicated by its development, can survive without administrative arrangement.

There is a contentious issue on „capital cities dispute“. It comes from irresponsible question how it is possible to govern such a large country in the process of transformation from one centre. (Galeotti 1998). Some authors think Moscow is a symbol of „Euroasian empire“ whereas Sankt-Peterburg has prerequisites to become a centre of new modern Russia, based on polycentric structure. S. Gradirovskij and S. Preslegin (2006) argue that system of one centre was profitable for period of creating classical imperial structure in the 19th and the beginning of the 20th centuries. Today, it is not an adequate answer of Russian challenges. It is, therefore, necessary to create more, functionally specialised and geographically favourably located power centres.

The new „power atlas“ should look as follows:

1. five cities having status of federal centres
 - Vladivostok as a presidential seat (the Pacific region being an impulse for Russia development),
 - Kazan (Samara) as a seat of prime minister and government,
 - Moscow as a seat of parliament,
 - Tomsk as a seat of judicious power,
 - Sankt-Peterburg as a seat of financial institutions.

2. seven cities as centres of okruh: Kaliningrad, e. g. Murmansk, Voronezh, e. g. Smolensk, Rostov, Nizhniy Novgorod, Yekaterinburg, Novosibirsk, Khabarovsk.
3. Cities having status of religious centres: Vladimir, e. g.. Kiev (Kyyiv), Sevastopol and Blagoveshchensk as centres of orthodox and Ufa, Kazan a Makhachkala as Islamic centres (authors mention the cities Kiev and Sevastopol despite they are located in the area of Ukraine).

Even though the reform will require organisational effort and decisiveness, as admitted by authors, it will optimise the management and acceleration of development.

CONCLUSION

It is without dispute that the arrangement of Russia as enormously large country is a very complicated problem. On one hand the look on political world map for Russians is very flattering, on the other hand it presents an economic problem. More than 17 million of km sq. is a relative brake for national economy in that the distance means a considerable burden. While in the rudiment economy development (colonisation of non-inhabited territories, trade with furs) this factor was unimportant, the current situation differs. It is inevitable the territory is evaluated, exploited and, in terms of state, managed (Basancon 2001). In this context a question raised: is the current power structure of Russia capable of handling these tasks.

It may be also said the Russia merges two different tendencies of development. On one hand it is an effort to secure the state unity, based on the legitimate homogeneity on all over the territory, on the other hand it is a heterogeneous regional-political structure. It may be said that the area, together with ethnic, cultural and economic heterogeneity has created conditions for higher degree of inner autonomy and absolute centralism is thus becoming impossible. On the other hand, the weakening of centre gave rise to worries of losing influence on regions, increasing separatism tendencies and the turbulence of all territorial state system (Ivašov 2006).

The solution, beneficial for the whole Russia would be in relevant regional politics conception, not only on hierarchical structure as it was so far. The politics should concentrate on net structure of Russian space based on organisation of direct intraregional relationships. The reserves are in the regions the elites of which have not yet outlined the univocal and intelligible political doctrine of regionalism. New „transregionalism“ would create new, allrussian, genuinely polycentric regional structure without directives from centre. Pragmatic view on the issue in terms of inner geopolitics would definitely contribute to Russian state stabilisation.

Acknowledgement: The paper is a part of grant project KEGA No. 3/4113/06 “Geopolitics, global sciences, international politics – conceptual framework and educational interpretation”. Head of project: Prof. RNDr. Robert Ištók, PhD.

References

- BAAR, V. (2005): Decentralizační a dezintegrační procesy v Ruské federaci v 90. letech minulého století. Ostrava.
- BACZWAROW, M., SULIBORSKI, A. (2002): Kompendium wiedzy o geografii politycznej i geopolityce. Warszawa – Łódź.

- BEJDINA, T. E. (2006): Geopolitičeskoje aspekty obščestvennogo rozvitiia Rossii v regional'nom izmerenii (teoretičeskij analiz).
<http://www.orenburg.su/culture/credo/11/8html> [11.9.2006].
- BESANCON, A. (2001): Teze o bývalém a dnešním Rusku.
http://www.rozhlas.cz/_zprava/91300 [5.2.2006].
- BUČEK, J. (1995): Geopolitika na konci 20. storočia. Medzinárodné otázky, IV, 3, 41 – 53.
- GALEOTTI, M., (1998): Čas úzkosti. Bezpečnosť a politika v sovětském a post-sovětském Rusku. Praha.
- GLASSNER, M. I. (1996): Political Geography. New York. Geopolitika i bezopasnost' Rossii: civilizacionnyj aspekt. <http://www.ctaj.elcat.kg/to/styi/a/a010htm> [11.9.2006].
- GRADIROVSKIJ, S., PERESLEGIN, S. (2002): Geografia novogo osvojenia.
<http://www.archipelag.ru/geopolitics> [7.6.2006].
- ILJIN, M. (1998): Etapy stanovlenija vnutrennej geopolitiki Rossii i Ukrainy.
http://www.archipelag.ru/ru_mir/ostrov-rus/iljin/making [11.9.2006]
- ILJIN, M. (2001): Problemy formirovanija „Ostrova Rossii“ i kontury jeho vnutrennej geopolitiki. http://www.archipelag.ru/ru_mir/ostrov-rus/cymbur/composition [11.9.2006].
- IŠTOK, R. (2003): Politická geografia a geopolitika. Prešov.
- IŠTOK, R. (2004): Súčasně ruské geopolitické myslenie v kontexte ideí slovanstva a slovanskej vzájomnosti. In: Bilasová, V., Dupkala, R., Žemberová, V. (eds.): Fenomén slovanstva I. Prešov, 139 – 150.
- IVAŠOV, L. G. (2006): Geopolitičeskoje protivoborstvo: mesto i roľ Rossii.
<http://www.ibci.ru/AGP/conferencia/statya01.htm> [22.9.2006].
- KOLOSOV, V. A. MIRONENKO, N. S. (2001): Geopolitika i političeskaja geografia. Moskva.
- KOTYK, V. (1998): Vztahy centra a regionů Ruské federace. Praha.
- KRIVOV, A., KRUPNOV, J. (2006): Vnutrenjaja geopolitika.
http://www.kroupnov.ru/5/92_1.shtml [23.8.2006].
- MICHAJLOV, T. A. (1999):, Evoljucia geopolitičeskich idej. Moskva.
- MITROFANOV, A. V. (1997): Šagi novoj geopolitiki. Moskva.
- NAZAROV, M. (2004): Vopros k prezidentu: Rossia dlja nerusskich? Naš sovremennik, 2004, 9, 192-202.
- Ó TUATHAIL, G. (1996): Critical Geopolitics. London.
- PIVOVAROV, Ju. L. (1992): Obščestvenno-geografičeskije problemy Rossii posle razpada Sojuza. Acta Universitatis Carolinae, Geographica, 27, 2, 37-54.
- SEREBRJANNIKOV, V. (1994): Geopolitičeskije interesy novoj Rossii i puti ich realizacii. Rossia v geopolitičeskom prostranstve. Moskva.
- SKOKAN, L. (2005): Rusko. Geografický přehled. Ústí nad Labem.
- ŠULGINA, O. V. (2005): Administrativno-territoriaľnoje delenije Rossii v XX veke: istoriko-geografičeskij aspekt. Voprosy istorii, 2005, 4, 23-38.
- TOMEŠ, J. (2000): Geopolitika: nástroj a proces politické organizace prostoru. In: Jehlička, P., Tomeš, J., Daněk, P. (eds.): Stát, prostor, politika. Praha, 151 – 179.

VNÚTORNÁ GEOPOLITIKA A JEJ VÝZNAM PRE HĽADANIE OPTIMÁLNEJ PRIESTOROVO-POLITICKEJ ŠTRUKTÚRY RUSKA – VYBRANÉ ASPEKTY

Zhrnutie

Hoci sa termín geopolitika v jeho rôznych modifikáciách používa stále častejšie, význam geopolitického myslenia pre politickú prax je nedocenený. Vyplýva to z jeho rozporuplného vývoja, ako aj z faktu, že teoretická báza geopolitiky je nedostatočne rozpracovaná. Tradičné chápanie geopolitiky je späté s jej medzinárodným (teda supraštátnym) rozmerom. Vnútroštátny aspekt geopolitiky, ktorý má významný vplyv na pôsobenie štátu ako subjektu medzinárodných vzťahov, bol donedávna na okraji pozornosti geopolitického myslenia. V súvislosti so štátnym, ale hlavne so subštátnym (regionálnym a lokálnym) rozmerom geopolitického myslenia možno používať termín vnútorná geopolitika.

Rast významu vnútroštátnych aktérov je spätý najmä s decentralizáciou kompetencií z ústredných orgánov štátu do regiónov a lokalít (miest a obcí). To sa odrazilo vo zvýšenom záujme o geopolitické analýzy vnútroštátnych aktérov, pôsobiacich v regionálnej a lokálnej mierke. Rozvoj vnútornej geopolitiky je zároveň odrazom úsilia o využitie poznania zákonitostí fungovania globalizovaného sveta v ktorom sa mení postavenie a úloha štátu. V novej globálnej situácii čoraz významnejšiu úlohu zohrávajú jednotlivé vnútroštátne regióny a lokality. Činnosti geopolitického charakteru teda nadobúdajú stále nové formy, pričom sa v ich rámci aktivizujú stále nové subjekty, ktoré do geopolitických procesov vťahujú stále viac ľudí. Tento proces sa odráža v raste počtu konfliktov rôzneho charakteru, v eskalácii mocensko-politického súperenia a boja o presadenie rôznych politických či kultúrnych hodnôt.

Nový smer v geopolitickom myslení, ktorý kladie dôraz na vnútornú priestorovo-politickú štruktúru štátov sa v posledných rokoch rozvíja najmä vo Francúzsku, USA, Spojenom kráľovstve, ako aj v štátoch Latinskej Ameriky. Táto priestorová mierka geopolitického myslenia bola postupne nazvaná vnútorná geopolitika (*inner geopolitics*, *la géopolitique interne*, *vnutrennjaja geopolitika*), ktorá je považovaná za súčasť inovačnej geopolitickej školy, ktorá je nazvaná novou geopolitikou. Široké chápanie vnútornej geopolitiky umožňuje koncipovať rozsiahle spektrum geopolitických analýz, preferujúc rôzne faktory s podmienkou zohľadnenia ich vnútroštátnych priestorových dimenzií. Vnútorná geopolitika zahŕňa o. i. problémy:

- utvárania a fungovania priestorovo-politickej organizácie štátu (ktorá sa skladá z politického členenia, územného a správneho členenia, volebných obvodov a pod.),
- priestorového rozloženia politických síl vo vnútri štátu,
- regionálneho plánovania a regionálnej politiky,
- medziregionálnych vzťahov (napr. vzťah centrum – periféria),
- postavenia menšín.

V súčasnosti sa veľmi široko zdôrazňuje význam vnútornej geopolitiky v intelektuálnych úvahách o budúcnosti Ruska. Cieľom takto zameraných geopolitických analýz je zhodnotenie súčasnej situácie a hľadanie alternatív dosiahnutia vnútornej stability Ruska

ako primárnej podmienky pre obnovu jeho veľmocenského postavenia. Prudký rozvoj geopolitického myslenia v Rusku možno považovať za zákonitý jav. Po traume rozpadu Sovietskeho zväzu je potrebné vrátiť frustrovanej ruskej spoločnosti sebavedomie a nádej na návrat ruského štátu na miesto, ktoré si svojimi historickými tradíciami, vojenskou silou, prírodnými a ľudskými zdrojmi, ale najmä svojou teritoriálnou veľkosťou zaslúži.

Geopolitické myslenie, umožňujúce formulovať širokú paletu záverov, sa stalo jedným z vhodných nástrojov pre posilnenie ruského sebavedomia. Pri rozvíjaní ruských geopolitických ideí sa v tomto kontexte často zdôrazňuje koncepcia „ostrova Rusko“, ktorú sformuloval V. L. Cymburskij. Podľa neho je potrebné sústrediť pozornosť ruskej inteligencie na vlastné, vnútorné problémy v duchu filozofických myšlienok, ktoré oslavujú Rusko ako sebestačný „tretí Rím“. Týmto smerom by sa mala zamerať aj geopolitika, ktorá je príznačne nazývaná „ostrovnou“.

Je potrebné poznamenať, že viacerí ruskí autori hľadajú inšpirácie pre zdôvodnenie celosvetovej nenahraditeľnosti veľkého ruského štátu aj v „klasickej geopolitike“. Zdôrazňujú globálne geopolitické postavenie Ruska ako Heartlandu, geografickej osi histórie, preberajúc tak intelektuálne dedičstvo H. Mackindera (pozri napr. Iljin 2001). Nevyhnutnosť jednoty ruského štátu je tak interpretovaná ako podmienka zachovania stability Eurázie, a - pri použití terminológie H. Mackindera - aj Svetového ostrova a teda celého sveta.

Geopolitická analýza Ruska musí nevyhnutne vychádzať z viacerých špecifických premis. Zdôrazniť treba predovšetkým bilanciu charakteristických znakov ruského štátu, ktorými boli:

1. Centralizovaná a štátom riadená ekonomika, ktorá mala zabezpečiť najmä kolosálnu vojenskú silu.
2. Prísne autoritatívny, resp. totalitný politický systém, spojený s mesianistickou ideológiou, ktorý bol jediný povolaný riadiť takto zameranú ekonomiku a ktorý bol opretý o obrovskú vojenskú silu.
3. Budovanie impéria, teda rozsiahla teritoriálna a politická expanzia, pričom zväčšovanie rozlohy štátu vytváralo nové zraniteľné miesta, čo stimulovalo ďalšiu expanziu.
4. Ustavičná konfrontácia s vonkajším svetom ako následok predchádzajúcich charakteristík, ktorá ospravedlňovala jeho politický systém a všetky jeho špecifiká (Michajlov 1999).

Vnútorná geopolitika Ruska sa usilovala po roku 1991 zdôrazniť faktory, ktoré Rusko spájajú do jedného celku, využívajúc geografiu, ale aj históriu, resp. kombináciu oboch. Tak je analýza mozaikového charakteru ruskej krajiny dávaná do súvislosti so vznikom viacerých „lokálnych“ či „regionálnych“ štátností na obrovskej ruskej rovine v období stredoveku, čo po oslobodení sa od tatárskeho jarma vyústilo do vzniku mohutného štátu prostredníctvom zákonitého procesu, nazývaného „zberom“ ruských krajín. Tento proces sa nezastavil na hraniciach ruského osídlenia, ale logicky pokračoval ďalej smerom na sever a východ, kde ruská kolonizácia vytvorila kraje „slobodných a podnikavých ľudí“, kým rozširovanie územia na západ a juh znamenalo priestorové spojenie s novou európskou, resp. starou ázijskou (blízkovýchodnou) históriou (Iljin 2001).

Rozpad Sovietskeho zväzu ako poslednej formy ruského impéria bol krokom späť. Proces dezintegrácie územia Sovietskeho zväzu však prebiehal nielen na úrovni zväzových republík, ale aj na úrovni subjektov Ruskej federácie. Oba tieto procesy sa na teritóriu Sovietskeho zväzu prelínali a navzájom ovplyvňovali (Kotyk 1998). Za jednu z príčin tohto javu je z hľadiska vnútornej geopolitiky považovaná ignorácia prirodzeného geopolitického členenia Ruska po víťazstve bolševikov, súvisiaca s vymedzením nových kváziautónomných administratívno-teritoriálnych celkov, z ktorých viaceré mali ambíciu opierať sa o etnickú štruktúru krajiny. Takto vytvorené deformácie začali počas krízy sovietskeho systému výrazne prejavovať svoj deštruktívny potenciál, ktorý je zachovaný dodnes, pretože tieto celky sa udržali v podobe subjektov Ruskej federácie. Centrum sa usilovalo riešiť nebezpečenstvo dezintegrácie formulovaním Federálnej zmluvy (podpísanej zástupcami takmer všetkých subjektov 31. marca 1992) a zdôraznením špecifického charakteru ruského federalizmu v Ústave (prijatej 12. decembra 1993). Oba dokumenty stabilizovali asymetrický charakter federácie.

Jednotlivé regióny Ruska sú výrazne špecifické z hľadiska svojho vnútorného vývoja, štruktúry obyvateľstva, ako aj úrovne rozvoja transformačných procesov a navzájom sa výrazne odlišujú. Asymetria ruského federálneho modelu spôsobuje značné vnútorné problémy, ktoré vyústili okrem iného do nevydarených pokusov niektorých „ruských“ federálnych subjektov (krajov a oblastí) získať status republík. V súčasnosti sa Rusko administratívne člení na 21 republík, 7 krajov, 46 oblastí, 1 autonómnu oblasť, 4 autonómne okruhy a 2 mestá s federálnym významom. Podľa V. A. Kolosova a N. S. Mironenka (2001) má toto členenie viacero nedostatkov. Predovšetkým je komplikované z hľadiska svojej hierarchickej štruktúry, keď jednotlivé subjekty rovnakej úrovne nie sú rovnoprávne, je nadmerne rozdrobené a mnohé centrá štátnej správy sú slabé z hľadiska ich postavenia v sídelnej štruktúre.

Situáciu komplikujú najmä ekonomické rozdiely medzi subjektami federácie, ktoré z tohto aspektu tvoria heterogénnu mozaiku regiónov. Takto sa vytvoril zložitý uzol vzájomných protirečení, spočívajúci najmä v rozpore medzi ekonomicky sebačinnými regiónmi na strane jednej a regiónmi dotovanými federáciou na strane druhej. Sebavedomie bohatých regiónov sa prejavovalo a prejavuje v ich snahe získať čo najvyšší stupeň politickej i ekonomickej autonómie. Chudobné regióny, dotované z centra si takýto prístup nemôžu dovoliť.

Vytvorenie siedmich okruhov ruským prezidentom 13. mája 2000 je chápané zo strany regiónov rozporne. Na jednej strane sa považuje za krok proti dezintegračným trendom a na druhej strane je chápané ako predpoklad rozvoja vzťahov medzi regiónmi navzájom. Podstatné je však, že ani prezident V. Putin nenašiel odvahu iniciovať radikálnu reformu administratívneho usporiadania Ruska. Zrejme sa aj tu uplatnila zásada, že lepšie je známe zlo než nové a že sa nemá nič riskovať veľkými zmenami, pretože tie by mohli zničiť všetko. Touto dilemou sa vyznačujú celé ruské dejiny (Galeotti 1998).

Súčasná analýza vnútornej geopolitiky Ruska sa logicky zameriava na identifikáciu jeho reálnej geopolitickej štruktúry v nových podmienkach. Opierajú sa najmä o vymedzenie jeho prirodzených jadier (ktoré môžu mať rôzny hierarchický stupeň) a periférií, pričom sa do úvahy berie rozsiahly komplex geopolitických faktorov. Zvláštny dôraz sa týchto analýzach kladie na problematiku postavenia zvlášť citlivých makroregiónov pre fungovanie ruského štátu, akými sú Povolžie, Ural, Sibír a Ďaleký východ.

Ukazuje sa však, že v prípade Ruska, najmä v kontexte jeho mocenských ambícií a veľkosti, nemožno striktné oddeliť vonkajšiu a vnútornú geopolitiku. Teda aj analýzy vnútornej geopolitiky Ruska musia byť bezpodmienečne podriadené jeho vonkajším záujmom, pričom primárnym z nich je obnovenie postavenia Ruska ako globálneho geopolitického aktéra. Súčasné geopolitické analýzy ruských autorov prevažne podporujú optimistický prístup k hľadaniu riešenia problému obnovy ruskej veľkosti. Vyplyva z nich, že nič nie je stratené a po období krízy dôjde nepochybne k obrode Ruska v podobe jeho návratu na bývalé pozície.

Ruské myslenie sa oddávna zmietať v hľadaní optimálneho smerovania ruského štátu, ktorý ťažko nachádzal duchovnú cestu do Európy a nebol považovaný ani za súčasť Ázie. Aj v súčasnosti je táto otázka aktuálna a súvisí s hľadaním cesty Ruska k vlastnej vnútornej i vonkajšej obrode. Spomínaná ruská duchovná dilema je stálou súčasťou ruského geopolitického myslenia, ktoré si dalo okrem iného za cieľ nájsť model pre stabilizáciu ruského štátu. V našom príspevku spomínáme iba niektoré prezentované koncepcie, ktoré však v istom zmysle načrtávajú trendy súčasnej ruskej geopolitiky.

Problém vzťahu centra a regiónov sa stal po rozpade Sovietskeho zväzu dominantným problémom ruskej vnútornej politiky. Možno konštatovať, že práve táto situácia podnietila rozvoj geopolitického myslenia Ruska v jeho vnútornej dimenzii. Výsledkom bola pomerne široká diskusia, ktorá sa usilovala nájsť riešenie, ktoré by viedlo k vnútornej stabilizácii ruského štátu. Viacerí autori v tejto súvislosti poukazovali na potrebu revízie územno-správneho členenia Ruska. Odôvodňujú to vysokým počtom subjektov federácie, ako aj značnými rozdielmi medzi nimi z hľadiska ich rozlohy, počtu obyvateľov, zdrojového a ekonomického potenciálu. Kritika poukazuje aj na skutočnosť, že tieto subjekty sú síce v zhode s platnou ústavou rovnoprávne, majú však rôzny status. Ďalším problémom je jav, ktorý je špecifický pre Rusko – niektoré subjekty federácie sú súčasťou iných subjektov (všetky autonómne okruhy okrem Čukotského autonómneho okruhu existujú v rámci oblastí alebo krajov). Všetky tieto okolnosti negatívne ovplyvňujú efektívnosť riadenia, vnútornú súdržnosť ako aj politickú stabilitu štátu. Rusko musí hľadať cestu, ako dosiahnuť uchovanie svojej jednoty a teritoriálnej celistvosti a zároveň zabezpečiť samostatnosť regiónov.

V značnej miere sa v tejto súvislosti uplatňujú myšlienky ruského nacionalizmu. M. Nazarov (2004) navrhuje odstrániť fiktívne národné útvary v ktorých titulárny národ tvorí menšinu a „diskriminuje ostatných občanov“. Namiesto umelých národných útvarov by bolo podľa neho potrebné zabezpečiť národnostným menšinám „všeruskú kultúrnu autonómiu nezávisle od miesta ich bývania“. K týmto myšlienkam sa pripája aj A. V. Mitrofanov (1997), ktorý tvrdí, že pre Rusov je nevyhnutné presadzovať „národný egoizmus“, pretože jedine tento princíp vyrieši ich dilemu ako národa vybrať si medzi „životom a smrťou“. Jeho uplatnenie znamená likvidáciu všetkých „národných suverení“ na území Ruska okrem suverenity ruského národa. Rusko by sa malo vrátiť k osvedčenému administratívne členeniu v podobe gubernií, ktoré fungovali na jeho území od panovania Kataríny II.

V Rusku sa okrem toho pomerne intenzívne hovorí o „spore hlavných miest“. Vyplyva z nezodpovedanej otázky, ako možno v podmienkach politickej a ekonomickej transformácie z jedného centra riadiť takú obrovskú krajinu (Galeotti 1998). Niektorí autori zastávajú názor, že Moskva je symbolom „eurázijskeho impéria“, kým Sankt-

Peterburg má predpoklady stať sa centrom nového, moderného Ruska, fungujúceho na báze polycentrickej štruktúry. S. Gradirovskij a S. Preslegin (2006) v tomto kontexte argumentovali faktom, že systém jedného centra bol výhodný pre obdobie vytvárania klasických imperiálnych štruktúr v 19. a na začiatku 20. storočia, dnes však už nie je adekvátnou odpoveďou na výzvy Rusku. Preto je potrebné vytvoriť niekoľko centier moci, ktoré budú funkčne špecializované a vzhľadom k tomu aj geograficky vhodne lokalizované. Autori tohto projektu uznávajú, že takáto reforma si bude vyžadovať značné organizačné úsilie a rozhodnosť, povedie však podľa ich názoru k optimalizácii riadenia a k urýchleniu rozvoja.

Na záver treba zdôrazniť, že vytvorenie funkčného vnútorného usporiadania takého obrovského štátu, akým je Rusko, je nepochybne zložitou otázkou. Na jednej strane je pohľad na politickú mapu sveta pre Rusov veľmi lichotivý, na druhej strane je teritoriálny štátny kolos značným ekonomickým problémom. Veľké vzdialenosti predstavujú pre ekonomiku značnú záťaž. Kým v období rozvoja rudimentárnej ekonomiky (kolonizácia neobývaných území, obchod s kožušinami) tento faktor nehral významnú úlohu, v súčasnosti je situácia odlišná. Územie je potrebné ekonomicky zhodnocovať, využívať a z hľadiska štátu najmä riadiť (Besancon 2001). V tomto kontexte je potrebné položiť si otázku, či je súčasná mocenská štruktúra ruského štátu schopná tieto úlohy zvládnuť.

Okrem toho možno povedať, že v Rusku sa stretávajú dva rôzne zamerané tendencie vývoja. Na jednej strane je to úsilie o zabezpečenie jednoty štátu, opierajúcej sa o právnú homogenitu na celom jeho teritóriu, na druhej strane je to nevyhnutnosť zachovania etnickej a ekonomickej svojbytnosti subjektov federácie, ktoré tvoria heterogénnu regionálno-politickú štruktúru. Možno konštatovať, že rozloha teritória, spojená s etnickou, kultúrnou a ekonomickou heterogenitou vytvárajú podmienky pre vysoký stupeň vnútornej samostatnosti regiónov a nevyhnutne znemožňujú dosiahnutie absolútneho centralizmu. Na druhej strane oslabenie centra vyvoláva v Rusku obavy so straty vplyvu na regióny, z rastu separatistických tendencií a z následného otrasu celého teritoriálneho systému štátu (Ivašov 2006).

Riešenie, prospešné pre celé Rusko, by malo spočívať v koncipovaní rozumnej regionálnej politiky, spočívajúcej nielen na hierarchickej štruktúre, ako tomu bolo doteraz. Táto politika by mala výraznejšie zohľadňovať sieťovú štruktúru ruského priestoru, založenú na organizácii priamych medziregionálnych vzťahov. Rezervy sú aj v regiónoch, ktorých elity zatiaľ neskociovali jednoznačnú a zrozumiteľnú politickú doktrínu regionalizmu, ktorý by nebol z centra traktovaný ako separatizmus. Nový „transregionalizmus“ by mal vytvoriť novú, všeruskú, skutočne polycentrickú regionálnu štruktúru, fungujúcu bez direktív z kompetenciami preexponovaného centra. Pragmatický pohľad na túto problematiku z pozície vnútornej geopolitiky by určite prispel k stabilizácii ruského štátu.

Recenzovali: Doc. RNDr. Vladimír Baar, CSc.
PhDr. Tomáš Koziak, M.A., PhD.

SLOVAKIA AND THE ANALYSIS OF ITS DISPARITIES

Radoslav KLAMÁR¹

Abstract: *The article deals with the issue of disparities in the Slovak Republic as a whole and also Slovak regional disparities. On the national basis, the Slovak Republic was compared with other EU member countries. On the regional basis, the differences between individual counties, respectively between the regions on the NUTS II level were evaluated. Taking into account the extent of the comparison, a set of indicators were chosen. These were divided into the following areas: economic structure, labour market, technical infrastructure and social infrastructure.*

Key words: *disparities, labour market, gross domestic product, foreign direct investment*

INTRODUCTION

The overall transformation of the Slovak society since 1989 in the field of politics, economy, culture and social issues, is reflected in the development of Slovak regions with different intensity and in a different way. The reforms passed on the national level should both help activate developmental activities in the regions, as well as reinforce and establish the position of Slovakia in united Europe. Close analysis of basic indicators of development is necessary to evaluate whether the undertaken trend is also the way leading to development. There are many such indicators but we chose the most representative and the most frequently followed indicators were chosen for a comparison, so that they showed the most important socio-economical disparities as close to reality as possible.

SLOVAKIA AND ITS POSITION WITHIN THE EU

Before we evaluate regional disparities in Slovakia, it is necessary to consider the overall position and importance of the Slovak Republic (SR) in the European Union.

Among the *key disparities* in terms of convergence of the SR with the countries of former EU-15 can be ranked: insufficient utilisation and productivity of the existing factors of economic growth, as well as of the potential of economic growth based on utilizing of information. The consequences of the first problem can be seen in several levels. It is mainly the low effectiveness (in terms of GDP per inhabitant in purchase power parity), which is the fourth lowest from the countries of EU-25 (only 57,1% of average), low added value, low labour productivity and high energy consumption of the economy – 410% of the average for countries of the EU-15. The other important measure is the low employment rate in Slovakia – 57,7% (the fifth lowest in the EU-25), which is 6,1% less than the overall average (highest level is in Denmark – 75,9% and the Netherlands – 73,2%); and high unemployment level (16,3%), which is the second highest in the EU, after Poland (see. tab. 24). Moreover, the unemployment rate in Slovakia is marked by the highest rate of long-term unemployment in the EU (11,7%, the EU average rate being only

1 **RNDr. Radoslav Klamár, 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: kllamar@unipo.sk*

3,9%); with the finances devoted to the labour market policies in SR represent mere 0,39% of GDP annually. Consequences of the latter problem can lead to loss of competitiveness of those industrial and service areas that underestimate the importance of knowledge for a sustainable development of its economic activities.

On the other hand, one of the *development factors* in Slovakia is high dynamics of economic growth. Economic policy is oriented towards better utilisation of traditional economic growth factors, which are built mainly on labour and capital usage through lower fixed costs, excess of labour force, disponibility and low prices of industrial areas, non-market advantages (investment incentives), etc. Foreign investors find particularly interesting low monthly costs of labour, as they represent only 701 € (22,3% of average in the EU-25), which makes them 5,5 times lower than in the most advanced European countries.

In general, it can be said that, together with Lithuania, Latvia, Poland and Estonia, Slovakia belongs to the least developed EU countries and that it will be one of the main receivers of structural help, together with newly accessed countries Romania and Bulgaria.

SLOVAKIA AND ITS REGIONAL DISPARITIES

The abovementioned development factors and disparities on the national level are reflected differently in the situation and development of the individual regions. In the Slovak republic, there are four regions defined on the NUTS II (NUTS III) level: Bratislava county; Western Slovakia (county of Trnava, county of Trenčín and Nitra county); Central Slovakia (county of Žilina and county of Banská Bystrica); and Eastern Slovakia (Prešov county and Košice county). Their status and importance is different, but it is necessary to take into account that there are two completely different structures, which are hard to compare, that enter this comparison – the Bratislava region and other regions of Slovakia. The specific status of the Bratislava region is caused by fact that 84,1% of its inhabitants reside in towns, and 71,5% in the capital – Bratislava. Individual evaluation indicators are divided into the following areas: economic structure, labour market, technical infrastructure and social infrastructure.

ECONOMIC STRUCTURE

Several indicators can be used while evaluating the efficiency of economy. The most representative of them is the gross domestic product (GDP), which is used for evaluating the economy growth rate, standard of living, as well as the intensity of development. Regional GDP is calculated as a sum of added values in regional industries and taxes for products minus subventions for the products. For comparative reasons GDP is calculated per inhabitant in purchasing power standards (PPS). The least developed region in terms of GDP per inhabitant is Eastern Slovakia (Prešov county and Košice county), which is also one of the 10 least developed regions in the EU-25 (tab. 1). It only reaches 39% of the EU countries average. Moreover, important regional disparities throughout the EU, as well as the west-east gradation of backwardness and poverty, are evident, as the poorest regions in the EU are mainly Polish, Hungarian and Slovak regions situated close to eastern borders of these countries.

Tab. 1: *Regional GDP (PPS per inhabitant in % of the EU-25 average) 2003*

GDP per inhabitant vs. EU-25 (2003)					
	Region (highest GDP)	GDP vs EU 25		Region (lowest GDP)	GDP vs EU-25
1.	Inner London (UK)	278	1.	Lubelskie (PL)	33
2.	Capitale/ Brussels (BE)	238	2.	Podkarpackie (PL)	33
3.	Luxembourg (LX)	234	3.	Podlaskie (PL)	36
4.	Hamburg (DE)	184	7.	Észak Magyarország (HU)	38
6.	Wien (AT)	171	8.	Východné Slovensko (SR)	39
10.	Stockholm (SE)	158	16.	Stredné Slovensko (SR)	43
53.	Bratislavský kraj (SR)	116	23.	Západné Slovensko (SR)	49

Source: <http://epp.eurostat.ec.europa.eu>

When we look at the development of GDP (tab. 2), it is clear that there are major differences between Slovak regions both in its level and its development. Bratislava region has (and enforces) a dominant position – its regional GDP per inhabitant was 380,1% of GDP in Prešov county (the lowest value); and 229,2% of national average GDP per inhabitant in the Slovak republic. West-east gradient in this indicator will increase in the near future because of strategic foreign investments taking place in Trnava and Žilina counties.

Tab. 2: *GDP (PPS per inhabitant in EUR) 1995-2003 and a proportion of economic sectors in 2003*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
GDP (PPS per inhabitant) 1995	14371	7523	6363	5830	5516	5627	4375	5896
GDP (PPS per inhabitant) 2000	20824	10032	8757	8314	7681	7834	5705	8418
GDP (PPS per inhabitant) 2003	25664	11628	10118	9657	8915	9554	6753	9913
GDP growth index (PPS per inhabitant) 2003/1995	178,6	154,6	159,0	165,6	161,6	169,8	154,4	168,1
GDP (PPS per inhabitant in % of the SR average) 2003	222,7	100,9	87,8	83,8	77,4	82,9	58,6	86,0
GDP (PPS per inhabitant in % of the EU-25 average) 2003	119,7	54,2	47,2	45,0	41,6	44,5	31,5	46,2
Proportion of agriculture (%) per reg. GDP	0,9	5,6	3,7	8,1	4,1	7,1	6,9	4,3
Proportion of industry and construction (%) per reg. GDP	22,5	47,8	45,6	42,4	39,8	30,0	30,7	31,4
Proportion of services (%) per regional GDP	76,6	46,6	50,7	49,5	56,0	62,9	62,5	64,3

Source: <http://www.statistics.sk>

Visible differences are present also in terms of gross added value in individual economic sectors: in the field of industry, construction and, mainly, services, Bratislava region reached 3, and sometimes 4, times the level of the most developed counties (134,5% and 255,3% of the SR average).

Tab. 3: *Value added (mil. Sk at current prices) 2003*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
Value added in Agriculture	2539	6555	4142	10215	4700	8195	6760	6016
Value added in Industry and Construction	63636	56238	51085	53319	45191	34687	30204	43917
Value added in Services	216381	54852	56767	62265	63571	72802	61528	89844
Value added - total	277225	115498	109844	123544	111320	113486	96569	137178

Source: <http://www.ueos.sk/mvrr.sr/isvov>

Thus, in terms of the earnings structure of the Slovak republic, as well as its regions, earnings for operations and goods in the field of industry represent the biggest part (more than 50% on average). Industrial production and services are concentrated in the western part of Slovakia, while the lowest values by far are seen in Prešov county (only 12,1% of Bratislava county and 36,9% of the national average). Earnings in Košice county are markedly 'positively' influenced by earnings of the U.S. Steel, Košice (91 milliard SKK – 2005).

Tab. 4: *Receipts and turnover (mil. Sk at current prices) 2005*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
Receipts from sales of agricultures products	2132	9193	4036	12932	2260	4081	2680	3384
Receipts from sales of industry	611170	181943	159763	99723	152560	117633	73647	201211
Construction production	31672	11408	11936	10355	21276	7006	12315	15335
Turnover in wholesale	257966	61769	55074	56467	86122	42225	54907	63741
Turnover in retail trade	138400	34750	26134	36194	55025	39257	30015	26007

Source: <http://www.statistics.sk>

The structure of production activities is influenced by historical development and implementation of industrial policies; and it changes very slowly, in spite of the problems with implementation of production programs, which are based mainly on the system of labour with low added value salary. New projects aimed at production development and at structural changes face problems with lack of investments. Privatisation has not brought along desired creation of entrepreneurial environment which would enable the development of production; and the inflow of investments (especially inflow of foreign funding FDI) is highly differentiated within the Slovak Republic, with influential part of the FDI is realised through non-market advantages that the state offers to an investor. While in 2001 was the FDI in Eastern Slovakia (without bank sector) more than 24% of all FDI, in 2005 it was only half – 12,1%. 'The poorest' counties, in terms of FDI, are Prešov county (7,1 milliard SKK – 1,7%) and Banská Bystrica county (10,8 milliard SKK – 2,6%). In Banská Bystrica county the increase of FDI in the period 2000-2004 only 4 milliard SKK and in Prešov county only 0,8 milliard SKK. Thus, in years 1996-2000 there was considerably more FDI allocated in the Prešov county than in the period 2000-2004.

On the contrary, the biggest investment incentives go, apart from Bratislava, to Žilina and Trnava counties.

Tab. 5: *Foreign direct investments (FDI) into the SR (mld. Sk) in 2004-2005*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
FDI entrepreneurial sector 2005	214,11	24,46	20,29	13,26	24,91	10,75	7,09	35,51
FDI total (entrepreneurial sector + banking sector) 2005	279,80	24,46	20,29	13,26	25,86	10,75	7,09	35,51
FDI total (%) 2005	67,1	5,9	4,9	3,2	6,2	2,6	1,7	8,5
Inflow of FDI 2004	16,34	4,12	2,29	0,93	2,32	0,85	0,99	1,02
Inflow of FDI 2005	7,80	0,28	2,86	0,93	6,97	0,85	0,12	0,82

Source: <http://www.sario.sk/?inflow-and-outflow-of-fdi>

Deciding factors for the inflow of FDI are: transport accessibility, service distribution, quality of the workforce, local identity, readiness and quality of self-government, and recently also absence of the rules for investments support. Another frequently mentioned important funding localisation factor is level of labour costs (see attached table), i.e. also the average salary level. In this field, together with labour productivity, the Prešov county, as the most undersized county in terms of investments, is also the least developed county. While the average salary in Prešov county represents only 56,8% of the average salary in Bratislava county, there is also a major difference in the labour productivity, as the difference between these two counties is almost 5-fold. This shows, that each investor will chose an investment in the Bratislava region, as, apart from other factors, here it will reach much higher earnings per employee even despite higher wage costs.

Tab. 6: *Average monthly wage and labour productivity 2005*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
Average monthly wage - total 2005 (Sk)	23212	16086	15121	14257	15172	14541	13185	17274
Index of average monthly wage 2005/1998	178,3	169,3	165,3	160,4	168,4	155,7	158,1	165,1
Average monthly wage in Industry 2005 (Sk)	22693	16160	14281	13960	14700	14296	12539	18853
Labour productivity in Industry 2005 (tis. Sk)	6477	2113	1392	1518	1784	1396	1238	2430
Labour productivity in Industry in % of the SR average	247,2	94,4	55,9	57,5	77,8	60,9	51,8	102,7

Source: <http://www.statistics.sk>

The abovementioned wage expenses (see attached table) were in the Slovak Republic in 2005 only 22,3% of the EU-25 level, which makes Slovakia to be still an attractive location in terms of cheap workforce. In this area Slovakia ,lags‘ not only behind the developed EU countries, but also behind the neighbouring countries like the Czech

Republic, Hungary and Slovenia, even though its growth index compared to 1996, was one of the highest (220,6). This advantage will disappear continually, due to both planned convergence of the EU regions and accession of Bulgaria and Romania into the EU space, as the wage expenses in these countries represent only 32,7%, respectively 51,1% of the SR level.

Development of small and mid-sized enterprises/entrepreneurialship (SME) is another important indicator of economic growth. During the 1996-2004 period the proportion of people employed in SME increased from 35,4% to 39,4%, with the majority of job opportunities were created by tradesmen, the proportion of which rose from 18,7% to 30,0% for the same period. The SME sector, as the creator of majority of job opportunities, managed to absorb major part of the workforce released by big factories and firms.

Tab. 7: *Small and middle enterprise 2004*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
No. of organisations focused on making profit /1000 inhab.	37,2	11,9	12,9	9,4	10,8	10,9	9,2	11,5
No. of tradesmen /1000 inhab.	94,4	66,0	63,6	57,8	69,6	53,7	56,2	46,3
No. of entrepreneurs in region per SR (%) – proportion	16,3	10,9	11,0	12,6	14,4	10,9	13,2	10,7
Average profit in enterprises – legal entities (thousands SKK)	978,2	333,4	347,0	-32,4	43,1	-189,6	-106,2	10,6
Average economic results before taxation – small enterprises	84,0	68,9	58,3	54,7	54,5	59,1	47,9	51,8

Source: <http://www.ueos.sk/mvrr.sr/isvov>

In terms of regions, the most SME, calculated per 1000 EAP (economically active population) are in the Bratislava county (160,0), the least in Košice (102,3) and Banská Bystrica counties (108,4). Similarly, most tradesmen are located in Bratislava county (59,2), least in Nitra county (16,6) and Prešov county (17,3). It is clear that the least developed regions are not yet able to create enough entrepreneurial activities and that the role of state interventions towards the SME sector and support of the entrepreneurial spirit can bring important results, for example even in solving of the high unemployment rate problem.

Another complex indicator, which evaluates the area of SME, is the business environment index (IPP), which has a form of a compound number, and which talks about the quality of the business environment in the regions of Slovakia. It combines the values of selected statistic indicators in the fields of economic activity, infrastructure, human resources and public authorities, with results of questionnaire surveys. According to the IPP results, the best entrepreneurial conditions can be found in Bratislava county, which has the index of 147,6 points. Opposite to this is the Prešov county, with the index value of 71,2. Even in the case of business environment, the difference between Bratislava county and the rest of Slovakia gets deeper. Notable differences are also visible when comparing Western Slovakia (82,5 points) with Central (74,3) and Eastern Slovakia (73,0).

Tab. 8: *Business environment index (IPP) 2004*

Hodnotený ukazovateľ	BA	TT	TN	NT	ZA	BB	PO	KE
subindex - economic activity	300,2	111,6	88,6	72,7	72,6	57,6	50,5	70,2
subindex - infrastructure	172,8	101,6	88,0	87,1	88,0	80,0	84,8	82,1
subindex – human resources	111,1	90,0	81,1	102,3	94,4	96,3	89,3	92,9
subindex – public statement	78,2	90,5	89,6	83,4	85,0	81,9	87,7	78,3
Business Environment Index – total	147,6	90,7	77,8	78,9	77,3	71,2	72,2	73,8

Source: *The Business Alliance of Slovakia (2005)*

LABOUR MARKET

In spite of the continuing decline, the unemployment rate remains very high and the employment rate too low, which is a consequence of the reduction of overemployment in industry and inadequate ability of economy to create new job opportunities. Even though in the period of 1999 and 2005 the number of people employed in Slovak economy increased, the unemployment rate still lags by 6,1% behind the EU-25 average and by 8,9 behind the average rate of the EU-15.

Tab. 9: *Employed by economic activity 2005*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
Number of employed - total (in thousand persons)	313,5	258,5	271,1	284,4	281,1	248,8	292,8	266,1
Proportion of the region per SR - employment in industry (%)	10,9	11,2	17,5	12,8	13,3	10,5	11,6	12,2
Proportion of the region per SR - empl. in agriculture (%)	4,5	14,7	10,4	19,0	10,5	15,1	14,2	11,7
Proportion of the region per SR - empl. in construction (%)	14,7	12,9	12,4	9,6	17,0	7,7	16,0	9,8
Proportion of the region per SR - employment in trade (%)	22,2	8,9	11,3	12,6	10,9	9,7	11,3	13,1

Source: <http://www.statistics.sk>

In terms of unemployment, Central Slovakia and (Banská Bystrica county and Žilina county) and Eastern Slovakia belong to 8 regions with the highest unemployment rate. It results mainly from the fact that young people (15-24 years old) represent a major proportion of overall unemployment, which indicates the problems of bad links between the labour market and a school system in the Slovak Republic.

Tab. 10: Regional unemployment rate (%) in EÚ-25 (2004)

Unemployment rate in EU-25 (2004)					
	Region (lowest)	v %		Region (highest)	v %
1.	Dorset a Somerset (UK)	2,4	1.	Dolnoslaskie (PL)	24,9
2.	North Yorkshire (UK)	2,6	2.	Východné Slovensko (SR)	24,2
3.	Province Autonoma Bolzano/Bozen (IT)	2,7	3.	Zachodniopomorskie (PL)	23,8
4.	Valle d'Aosta/Vallée d'Aoste (IT)	3,0	4.	Halle (DE)	23,4
5.	Cheshire (UK)	3,1	5.	Lubuskie (PL)	23,2
8.	Tirol (AT)	3,3	6.	Dessau (DE)	22,9
	Average of EÚ 25	9,2	8.	Stredné Slovensko (SK)	22,1

Source: <http://epa.eurostat.ec.europa.eu>

In spite of progressive decrease of the rate of registered unemployment, its rate in the least developed regions (Prešov, Košice and Banská Bystrica counties) remains in limits of 14,7-16,8% (2006). It is not only the level of unemployment, but also its structure which is unfavourable for these regions. The risk group of inhabitants with basic education only, or even uneducated people, still represents a big problem. It is mainly Roma population that, apart from social exclusion, is markedly disadvantaged on the labour market. The other significant problem in these regions is a category of long-term unemployed people (without employment for 12 months and more), which represents more than 55% of total unemployment. This category is risky, which is a result not only of the economic view (i.e. sinking under the poverty line), but also of social marginalisation and loss of labour skills and habits, which has a long-term consequences reflected in a difficult re-adaptation to the labour market.

Tab. 11: Unemployment rate in SR 1997-2006 and its structure 6/2006

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
Unemployment rate (%) 1997	4,6	11,5	9,1	15,0	11,7	15,9	18,9	18,3
Unemployment rate (%) 2000	6,4	14,9	12,7	21,7	16,8	21,8	22,1	24,4
Unemployment rate (%) 2003	4,0	11,1	9,9	19,1	13,2	21,3	19,6	22,2
Unemployment rate (%) 2006 (jún)	2,5	6,4	6,0	10,4	7,9	16,8	14,7	16,6
Index of unemployment rate 2006/1997	54,3	55,6	65,9	69,3	67,5	105,7	77,8	90,7
<i>Risk groups (%) (2006):</i>								
Proportion of long-term unemployed	20,6	40,8	39,0	52,0	45,1	59,4	56,5	59,3
Proportion of unemployed with elementary education and apprentice training	44,7	68,5	63,6	69,1	63,2	74,2	73,4	73,9
<i>No. of job opportunities /100 inhab. in the counties of SR (2006)</i>								
Agriculture	1,0	3,5	1,8	3,7	2,0	3,1	2,6	2,3
Industry and Construction	10,0	11,0	18,3	10,7	12,2	12,0	8,6	10,2
Trade and Services	45,7	18,7	17,1	20,3	22,1	25,3	18,6	24,0

Source: Úrad práce, sociálnych vecí a rodiny SR (2006)

According to Eurostat data, 16% of all population face poverty. The group most endangered by social exclusion and poverty are children (the poverty risk level of children

in the Slovak Republic is 30%), long-term unemployed (mainly young people less than 25-years-old), incomplete families, elderly people above 50 years of age, disabled people, persons on parental leave and the Roma minority living in marginalised communities.

TECHNICAL INFRASTRUCTURE

Even though infrastructure has mainly a support role, it represents an important impulse for development of any region. Hirschman (1958 In Blažek, Uhlíř, 2002) argues that while sufficient infrastructure will not cause the development of production, the opposite causality exists – production development causes a pressure on the infrastructure development.

Transport Infrastructure

Developed and satisfactory transport infrastructure is a vital predisposition for a functional transport system and well functioning economy. Speed, regularity and the amount of transported materials and goods are an important competitiveness factor of many entrepreneurial subjects, which has a direct influence on the development of economic activities in the region. However, the role of transport infrastructure is only the supporting one, i.e. it does not necessarily have to be a development catalyst itself.

Tab. 12: Road network in SR 2004

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
Lenght of motorways (km/1000 km ²)	50,2	16,3	15,4	0,0	6,8	0,0	3,4	0,8
Percentage of motorways in the length of roads in the county	12,9	3,5	3,7	0,0	2,4	0,0	1,0	0,2
Percentage of 1st class roads in the length of roads in the county	16,4	13,9	16,2	19,5	25,6	18,1	20,2	15,4
Percentage of 2nd class roads in the length of roads in the county	26,4	27,6	18,8	19,7	15,6	22,9	16,9	24,6
Percentage of 3rd class roads in the length of roads in the county	44,3	55,0	61,2	60,7	56,4	59,0	61,9	59,7
Automobilisation degree (No. of inhabitants per 1 vehicle)	2,5	3,6	4,4	4,1	4,8	4,6	5,3	4,7

Source: Regionálne porovnania v SR 2004. Štatistický úrad SR

The highest quality road network can be found in the western part of Slovakia (most highways in this region), which is reflected in a good accessibility of the area and, consequently, in the foreign investments influx. Central and Eastern Slovakia have a relatively high amount of the 1st class roads, yet also of the 3rd class roads that are in a considerably bad state due to low funding of their maintenance and repairs. In terms of automobilisation, which from a major part corresponds with the level of purchasing power of population, the dominating region is Western Slovakia, mainly Bratislava county (2,5 persons/1 car).

Characteristic for the railway infrastructure in the Slovak Republic is its relatively high density network (75 km/km², EÚ-15 only 47). However, due to the lack of renewal and low technical level and quality of equipment, the effectiveness of railroads is low. In terms

of railroads accessibility the least accessible are the largest counties – Prešov and Banská Bystrica counties, in which two-rail tracks are missing and where a higher proportion of regional lines can be found. These lines, in terms of speed and low transport operating efficiency marginalise the area and, sometimes, they are also cancelled due to their low economic effectiveness.

Tab. 13: *Railways in SR 2004*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
Lenght of railways (km/1000 km ²)	121,3	74,3	70,3	89,1	57,6	72,9	48,2	104,6
Percentage in length of railway tracks in SR (%)	6,8	8,4	8,7	15,5	10,7	18,9	11,8	19,3
Percentage in length of double-track railway lines in SR (%)	10,1	15,4	11,4	9,2	23,3	4,1	3,6	22,9
Percentage in length of regional railway lines in SR (%)	9,5	2,4	6,1	10,5	16,6	21,3	19,8	13,8

Source: <http://www.telecom.gov.sk>

Environmental Infrastructure

Out of the total population of the SR, only 56,1% of inhabitants (only 24,0% of municipalities) reside in the houses with access to public sewage system, which is a number too low when compared to the developed EU countries (84,4%). Sewage water transport and purification lags behind drinking water supplied through water-supply system, as 85,1% of population (79,9% of Slovak municipalities) has access to this system. This shows the need of considerable funding of further building of sewerage system and of wastewater treatment equipment and plants. It is not only a duty for the Slovak Republic, as stated by the EU accession treaty, but also an important element of the living standard and environment protection.

Tab. 14: *Municipalities and inhabitants with Access to public water-supply and sewage system in 2004*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
Percentage of inhabitants with water-supply system access	98,6	95,2	72,5	89,3	85,6	90,0	73,4	76,1
Percentage of municipalities with water-supply system access	94,5	80,9	83,0	85,0	95,2	72,1	58,9	69,8
Percentage of inhabitants with sewage system access	85,1	52,6	47,2	45,1	51,7	59,4	51,4	56,6
Percentage of municipalities with sewage system access	47,9	33,5	16,3	20,9	24,8	17,4	15,8	15,2
Urbanisation level (%)	83,4	49,6	57,4	47,5	50,8	54,0	49,3	56,3

Source: *Regionálna porovnania v SR 2004. Štatistický úrad SR*

The issue of waste disposal is a separate problem, as the increase in its production requires a support in the field of prevention and minimising of the waste production; of its processing and separated waste collection. When compared to the EU-15, the issue

of communal waste is characterised by the level of production lower almost by 300kg/person/year (42%), yet the level of waste processing in Slovakia is only 12,7%, with the highest proportion of it happening in Bratislava county – 51,0% of the communal waste is being processed, mainly by incinerating.

Tab. 15: *Structure of waste economy in the SR counties in 2005*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
Dangerous waste in thousands of tons	2082,3	1485,1	1087,9	1999,0	1061,6	1820,6	747,4	4001,9
Communal waste (CW) thousands of tons	233,5	200,3	161,7	211,5	198,9	146,2	162,4	161,0
Amount of CW in kg/inhab./year	374,5	310,7	259,8	288,2	269,3	213,8	199,6	205,1
Proportion of processed CW (%)	51,0	6,8	6,9	7,5	8,6	5,8	11,5	3,9
Proportion of foiled CW (%)	49,0	93,2	93,1	92,5	91,4	96,1	93,0	97,0
Dumps of dangerous waste/not dangerous waste/inert	2/6/2	2/19/2	1/15/3	2/21/2	1/16/3	1/21/2	1/21/1	3/12/3

Source: Program odpadového hospodárstva SR do roku 2005. <http://www.enviro.gov.sk>

Information Infrastructure

As for the telecommunication infrastructure, Bratislava county dominates in all analysed areas (63,9%, 50,5% respectively 193,7% more than the SR average). Ratio of other counties is on a comparable level, with Žilina and Prešov counties lagging the most behind the average.

Tab. 16: *Telecommunication infrastructure 2004*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
No. of telephone connection per 1000 inhab.	382,4	219,7	237,6	216,3	201,9	222,8	196,5	214,5
- of which: housing per 1000 inhab.	266,6	168,6	189,1	168,2	153,2	169,1	148,4	170,0
Telephone connection ISDN per 1000 inhab.	52,0	18,6	12,1	14,1	14,3	13,1	10,7	12,4

Source: Regionálna porovnania v SR 2004. Štatistický úrad SR

Number of customers attached to the Internet in the Slovak Republic grows constantly. While in 1997 there was only 20995 of them, in 2005 it was 521341. It is almost a 40-fold increase when calculated per 1000 inhabitants. This positive trend can be a result of both, the possibility of gaining and presenting a wide variety of information by means of the Internet, as well as of the increase of possibilities and decrease of the prices for connection to the Internet. In spite of this, though, Slovakia remains at the last place in the EU in the sphere of proportion of households connected to the web (see the attached Table). As for the regions and counties, dominant is, again, the Bratislava county (244,0), and partly a Trnava and Košice counties. The lowest number of customers can be found in the Prešov county.

Tab. 17: *Enlargement of internet in SR 1996-2005*

Analysed indicator	1997	1998	1999	2000	2001	2002	2003	2004	2005
No. of internet users per 1000 inhab.	11,7	26,8	54,2	93,8	125,3	160,4	255,8	422,7	463,9
No. of internet clients per 1000 inhab.	3,9	6,5	8,7	12,5	18,6	24,9	33,9	73,9	96,8
- of which: housing (%)	-	-	29,6	39,3	40,7	47,4	53,2	34,2	34,6
- of which: nonhousing (%)	-	-	70,4	60,7	59,3	52,6	46,8	23,8	21,9
- of which: via mobile networks (%)	-	-	-	-	-	-	-	42,0	43,6

Source: <http://www.telecom.gov.sk/externe/telekom/statistika/search.htm?ZOBRAZ&0&1991&24>

In terms of the structure of Internet connection, the xDSL connection is the most common (30,9%), dial-up access (24,9%) and connection through ISDN (8,5%).

Tab. 18: *Number and structure of internet clients 2005*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
No. of internet clients per 1000 inhab.	244,0	103,4	77,1	70,6	76,2	64,9	48,8	103,2
Permanent access	2390 (4,9)	175 (0,3)	110 (0,2)	819 (1,2)	75 (0,1)	88 (0,1)	492 (0,6)	16407 (3,5)
Through cable modem	19483 (32,4)	676 (1,2)	8 (0,0)	87 (0,1)	914 (1,3)	0 (0,0)	3 (0,0)	323 (0,4)
XDSL connection	28723 (47,8)	13613 (24,6)	11548 (19,2)	9746 (13,7)	9820 (14,1)	10391 (15,8)	9653 (12,1)	10993 (14,3)
With permanent radio access	1939 (3,2)	4538 (8,2)	1472 (2,4)	1478 (2,1)	7131 (10,3)	1260 (1,9)	892 (1,1)	3163 (4,1)
Commute circuits – dial-up access	14829 (24,7)	10507 (19,0)	9137 (15,2)	9639 (13,6)	9118 (13,1)	10110 (15,4)	8101 (10,2)	8203 (10,6)
Commute circuits – ISDN connection	8346 (13,9)	3269 (5,9)	4142 (6,9)	3404 (4,8)	4133 (6,0)	3817 (5,8)	3132 (3,9)	2683 (3,5)

Source: <http://www.telecom.gov.sk/externe/telekom/statistika/search.htm?ZOBRAZ&0&1991&24>,
(in brackets) – counted on 1000 inhab.

SOCIAL INFRASTRUCTURE

Residential Buildings

The differences in the field of housing still remain both in the quantitative (number of inhabitants and number of flats) and quality (flat size and area indicators) level of housing. Both of these lag behind the EU average. High quality and accessible housing is an important factor that can influence the workforce mobility (one of the serious problems of the Slovak economy). The housing situation and solutions of the problems in this field vary considerably from one region to another. While in the regions with high inflow of foreign investments (Bratislava, Trnava and Žilina counties) the building and finishing of flats is significant (in total more than 58% SR), in Prešov, Košice and Banská Bystrica counties it is not more than 25%, even though 42,1% of Slovak population lives in these counties and they also have the 2nd, 3rd and 5th largest town in Slovakia as their centres.

Tab. 19: *Structure of housing stock in SR 2005*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
Begined dwellings	7079	3681	1634	1388	2208	909	1672	1225
Percentage per SR (%)	35,4	18,4	8,2	6,9	11,1	4,6	8,4	6,1
Completed dwellings	4673	2055	1575	1087	1997	772	1343	944
Percentage per SR (%)	32,3	14,2	10,9	7,5	13,8	5,3	9,3	6,5
Builed partially dwellings	12033	7616	3903	4486	6871	3193	5821	4951
Percentage per SR (%)	24,6	15,6	8,0	9,2	14,1	6,5	11,9	10,1
Average living space (m²)	72,9	71,9	64,9	80,4	71,7	74,1	74,0	86,4
Permanently lived-in flats/1000 inhab.	364,9	306,4	315,5	324,0	292,3	329,0	263,7	296,8

Source: <http://www.ueos.sk/mvrr.sr/isvov>

Construction and building of flats also has a significant influence on the number of flats per 1000 inhabitants. In this area are again the dominant counties situated in the western part of the country, especially Bratislava county (367,9). On the other hand, the leeway is most remarkable in the Prešov (263,7) and Žilina (292,3) counties. Yet in Žilina county, due to fast flat building, which is a consequence of an important foreign investment KIA, the state progressively improves. In Eastern Slovakia, the most common is building of municipal social flats, as prices of newly built flats on a commercial basis (with the prices on the level of e.g. Bratislava) are too high compared to the low income level of people here. As for the flat prices in general, there is a visible decrease in west-east direction, which can be connected with the attractiveness of the regions in terms of investments, purchasing power of people, new flats construction and a migration to Western Slovakia and Bratislava.

Tab. 20: *Comparison of prices for 3-bedroom flats (v millions SKK) in regional centres in 2006*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
Standard dwelling	2,3 - 3,4	1,6 - 2,5	1,5 - 2,3	1,5 - 2,0	1,6 - 2,7	1,2 - 3,1	0,9 - 1,8	0,9 - 3,6
New building / luxury dw.	6,5 - 8,0	2,9 - 3,9	2,6	2,6	3,2	4,9	2,2	4,2

Source: www.reality.sk

Education, science and research

Public expenses in the field of education have decreased significantly since 1989. In 2000 they were 4,2% of GDP, while the average in the EU-15 countries was 5,0% of GDP. Many of the educational institutions are in bad technical state and this results in high running costs. Education quality and accessibility is influenced by the long-term lack of funding from the state, municipalities and self-government authorities, which results in an unsatisfactory technical state of buildings and equipment, as well as high running costs.

The number of pupils/students calculated per 1000 inhabitants of a county is one of the partial indicators evaluating high/secondary schools and universities. The highest proportion is in Bratislava county, with the exception of apprentice vocational schools. The number of university students in Bratislava county is biased due to a significant number of

students commuting from other counties, as Bratislava is a university centre of Slovakia. Universities in other counties have mainly a regional importance and status.

Tab. 21: *Numbers of pupils and students of high schools and universities in 2004*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
No. of students at Comprehensive secondary schools/1000 inhab.	30,7	15,5	15,2	16,2	18,9	17,4	18,1	19,1
No. of students at Specialised high schools /1000 inhab.	20,7	17,2	11,8	16,1	19,0	15,8	17,7	20,7
No. of students at Secondary vocational schools /1000 inhab.	13,1	16,5	14,5	11,6	15,1	9,7	17,3	16,6
No. of students at universities (full-time) /1000 inhab.	69,8	10,4	5,4	17,9	15,5	15,3	7,9	21,1
No. of students at universities (total) /1000 inhab.	95,9	20,3	8,2	29,2	23,4	29,5	12,0	26,3

Source: Regionálna porovnania v SR 2004. Štatistický úrad SR

The funding (from public funds) for public universities in 2006 was 11,6 milliard SKK. This amount was progressively growing in the last few years: 8,3 milliard SKK (2003), 9,4 milliard SKK (2004) and 10,4 milliard SKK (2005), even though the real amount of total expenses for universities in years 1989-2000 decreased by 37,5%. Quality and success rate of individual universities varies a lot. Academic Rating and Ranking Agency (ARRA) used the following criteria in universities evaluation process in 2005: teachers and students, interest in studying at the particular university, publications and citations, PhD. Studies and grants.

Tab. 22: *Evaluation (in points) of universities by the ARRA* agency in 2005*

County	University	Evaluation of university (county)
BA	Slovenská technická univerzita / Univerzita Komenského / Vysoká škola výtvarných umení Vysoká škola muzických umení / Ekonomická univerzita	55 / 52 / 51 / 43 / 32 (47)
TT	Trnavská univerzita / Univerzita sv. Cyrila a Metoda	42 / 24 (33)
TN	Trenčianska univerzita A. Dubčeka	32 (32)
NT	Slovenská poľnohospodárska univerzita / Univerzita Konštantína Filozofa	46 / 30 (38)
ZA	Žilinská univerzita / Katolícka univerzita v Ružomberku	39 / 27 (33)
BB	Akadémia umení / Univerzita Mateja Bela / Technická univerzita vo Zvolene	37 / 30 / 55 (41)
PO	Prešovská univerzita	35 (35)
KE	Univerzita veterinárneho lekárstva / Univerzita P.J. Šafárika / Technická univerzita v KE	80 / 49 / 43 (57)
SR	Priemer za všetky slovenské vysoké školy	(42)

Source: Hodnotenie vysokých škôl a ich fakúlt v roku 2005. MŠ SR (2006). ARRA* - občianske združenie Akademická rankingová a ratingová agentúra

The main university centres in Slovakia are Bratislava (47 pts) and Košice (57 pts), with a minor centre in Banská Bystrica (41 pts). Other counties lag behind both in the variety of study fields offered as well as in their quality, even though the quality of some universities reaches that of Bratislava and Košice universities – e.g. Technical University in Zvolen (55 pts) and Slovak Agricultural University in Nitra (46 pts).

Almost half of all the staff in science, research and development field Works in Bratislava county at present. The consequence of this uneven distribution of scientific and research institutions in Slovakia is also the uneven distribution of funding for science and research – Bratislava county gets 49% of this funding, while Prešov county receives less than 3%. Science and research funding had a falling trend in the years 1993-2004. While in 1993 they represented 1,53% of GDP, in 2004 it was 0,53% and in 2005 only 0,51%, which is the least in the EU-25 (together with Cyprus – 0,40%). Average expenses per 1 employee in the field of research and development in 2004 reached the amount of 401,4 thousand SKK. The highest level was seen in Trenčín county (1386,4 thousand SKK), the lowest in Košice county (241,1 thousand SKK).

Tab. 23: *Science & research in 2004*

Analysed indicator	BA	TT	TN	NT	ZA	BB	PO	KE
No. of organisations in Science & research in 2004	105	22	33	20	27	21	19	25
No. of employees (researchers) in Science & research in 2004	8357	829	560	1548	1624	1291	583	2562
Science & research - Expenses (millions of SKK) in 2004	3432,5	657,8	776,4	425,5	493,5	356,2	205,8	617,7

Source: Regionálne porovnania v SR 2004. Štatistický úrad SR

CONCLUSION

Taking into account the length of this article, it is impossible to evaluate in it the regional disparities in Slovakia in all their depth. Therefore, only the basic evaluation socio-economic indicators were chosen, as they show that the Slovak Republic belongs to the group of less developed EU countries, such as Lithuania, Latvia, Estonia and Poland. According to some indicators (unemployment rate, long-term unemployment rate, public expenditure on labour market policy measures, GDP on research and development) Slovakia belongs to the least developed countries in the EU framework. In terms of regional disparities Bratislava county dominates in almost all indicators. Out of remaining regions Western Slovakia has the leading position. On the other end of the scale is Eastern Slovakia and mainly Prešov Region, which lags behind most and this disparity deepens progressively. This trend is unfavourable for the balanced development of Slovakia, not even the regional politics is efficient in that area. From the point of view of the near future it is possible to presume that also henceforward the strongest economic regions will develop, and the regional disparities will even deepen.

Acknowledgement: This paper we prepared with the contribution of the grants: VEGA 1/3050/06 „Kvalita života – konceptuálny rámec geografickej interpretácie priestorovej štruktúry mesta.“ and VEGA 1/0210/08 „Špecifické postavenie regiónu Východné Slovensko v kontexte regionálnych disparít Slovenskej republiky“ na Katedre geografie a regionálneho rozvoja Fakulty humanitných a prírodných vied Prešovskej univerzity.

References

- BENČ, V. (2006): Prešovský kraj – súčasný stav a potenciál socio-ekonomického rozvoja.
- BLAŽEK, J., UHLÍŘ (2002): Terrie regionálního rozvoje. Univerzita Karlova, Karolinum, Praha, s. 211
- FOGAŠ, A. (2003): Regionálna politika Európskej únie, Geografické aspekty stredoevropského priestoru, Geografie XIV, MU Brno, pp.31 – 35, ISBN 80-210-3208-1
- FOGAŠ, A. (2002): Vývoj integrácie SR do EÚ od rozpadu Česko-slovenska po Helsinský summit. Geografické informácie 7, Zborník z XIII. Kongresu SGS., II. Diel, UKF Nitra, 114-120, ISBN 80-8050-543-8, EAN 9788080505431
- KLAMÁR, R., KROKUSOVÁ, J. (2005): Štruktúra priemysle v Prešovskom kraji. Folia Geographica 8, AFŠHUP, ročník XLIII., Prešov, 34-66
- KOL. (2005): Mapovanie regionálnych podmienok na podnikanie. Index regionálneho podnikateľského prostredia. Podnikateľská aliancia Slovenska, Bratislava, 69 s.
<http://www.alianciapas.sk/pas>, 10.6.2007
- KOREC, P. (2005): Regionálny rozvoj Slovenska v rokoch 1989-2004. Geografika Bratislava, s.227, ISBN 80-969338-0-9
- MATLOVIČ, R., MATLOVIČOVÁ, K. (2005): Vývoj regionálnych disparít na Slovensku a problémy regionálneho rozvoja Prešovského kraja. Folia geographica 8, Prešov, 66-88, ISSN 1336-6157
- Ministerstvo výstavby a regionálneho rozvoja SR (2006): Národný strategický referenčný rámec, 2007-2013 (3 verzia). Bratislava.
- ROSIČ, M. (2002): Vývoj miery nezamestnanosti vybraných okresov severovýchodného Slovenska v období rokov 1991-2000. Geografické informácie 7, II. diel, UKF Nitra, s.157-164, ISBN 80-8050-542-X
- ROSIČOVÁ, K., ROSIČ, M., TÖRÖK, Z., HAJDU, M. (2005): Slovakia, the most attractive investment location in Europe, CEBIS – Central European Business Services, Košice, 99s., ISBN 80-969309-0-7
- SLOBODA, D. (2006): Slovensko a regionálne rozdiely – teórie, regióny, indikátory, metódy. Konzervatívny inštitút M. R. Štefánika, Bratislava, s. 49
- Regionálna porovnania v SR 2004. Štatistický úrad SR, Krajská správa v Prešove, 2005
- Štatistický bulletin 4/2005. Štatistický úrad SR, Krajská správa v Prešove, 2006
- Ministerstvo školstva SR. Hodnotenie vysokých škôl a ich fakúlt v roku 2005. Akademická rankingová a ratingová agentúra. Bratislava,
http://www.arra.sk/index.php?module=pagemaster&PAGE_user_op=view_page&PAGE_id=15&MMN_position=11:5, 15.7.2007
- Ministerstvo životného prostredia SR. Program odpadového hospodárstva SR do roku 2005.
http://www.enviro.gov.sk/servlets/page/317?cid=371&cid=179&cid=180&cid=372&cid=404&cat_id=2104&o_id=4430, Bratislava, 15.7.2007
- Ministerstvo výstavby a regionálneho rozvoja SR. Informačný systém výstavby a regionálneho rozvoja (ISVRR). Bratislava, <http://www.ueos.sk/mvrr.sr/isvov>, 15.7.2007
- Ministerstvo dopravy, pôšt a telekomunikácií SR.
<http://www.telecom.gov.sk/externe/telekom/statistika/search.htm?ZOBRAZ&0&1991&24>, 20.8.2007
- Slovenská agentúra pre rozvoj investícií a obchodu (SARIO). Prílev a odlev PZI. Bratislava,
<http://www.sario.sk/?prilev-a-odlev-pzi>, 8.6.2007

Štatistický úrad SR. Bratislava, <http://www.statistics.sk>
EUROSTAT. <http://www.eurostat.com>

Tab. 24: Development indicators comparison in the EU countries in 2004-2005

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
EU 25	100,0	63,8	11,9	21,2	3140	-	3,9	-	1,85	18	10,2	51
Belgium	118,1	61,1	8,4	30,7	3938	8,4	4,4	3,33	1,82	7	8,3	54
Denmark	121,9	75,9	-	*30,7	*4186	4,8	1,1	4,19	2,44	13	27,4	79
Germany	110,0	65,4	5,6	26,4	3787	11,2	5,0	3,17	2,51	15	7,7	67
Greece	84,1	60,1	4,3	*13,4	*1984	9,8	5,1	0,61	0,61	7	1,9	23
Spain	98,0	63,3	8,3	15,2	2135	9,2	2,2	2,05	1,12	6	10,5	39
France	108,2	63,1	7,3	29,3	4296	9,5	4,0	2,44	2,13	20	7,1	41
Ireland	138,9	67,6	-	-	-	4,3	1,5	0,68	1,25	29	7,4	50
Italy	100,4	57,6	16,0	*21,4	*2904	7,7	3,9	1,31	1,10	7	5,8	40
Luxemburg	251,1	63,6	-	*28,3	-	4,5	1,2	0,69	1,56	30	8,5	70
Netherlands	125,6	73,2	2,0	27,4	3974	4,7	1,9	3,36	1,78	19	15,9	80
Austria	123,1	68,6	4,1	*25,3	-	5,2	1,3	1,83	2,36	15	12,9	52
Portugal	71,1	67,5	3,3	10,6	1557	7,6	3,7	1,87	0,81	8	4,1	35
Finland	110,7	68,4	5,5	26,4	3573	8,4	2,2	2,85	3,48	18	22,5	65
Sweden	114,8	72,5	3,0	*30,4	*4313	7,5	1,2	2,32	3,86	14	32,1	77
United Kingdom	117,6	71,7	5,7	24,5	4071	4,7	1,0	0,45	1,73	23	27,5	63
Slovakia	57,1	57,7	9,8	4,8	701	16,3	11,7	0,39	0,51	5	4,6	27
Czech Republic	73,7	64,8	5,5	6,6	954	7,9	4,2	0,39	1,42	14	5,6	29
Poland	49,7	52,8	5,6	5,6	818	17,7	10,2	-	0,57	3	4,9	36
Hungary	62,5	56,9	9,9	6,1	944	7,2	3,2	0,59	0,94	22	3,9	32
Slovenia	81,9	66,0	-	10,8	1605	6,5	3,1	-	1,22	5	15,3	54
Estonia	59,8	64,4	-	4,7	713	7,9	4,2	-	0,94	10	5,9	46
Latvia	48,0	63,3	-	2,8	433	8,9	4,1	-	0,57	3	7,9	42
Lithuania	52,1	62,6	-	3,6	556	8,3	4,3	0,26	0,76	3	6,0	35
Cyprus	88,9	68,5	-	*11,1	*1903	5,3	1,2	-	0,40	16	5,9	37
Malta	70,4	53,9	-	8,4	1386	7,0	3,4	-	0,61	56	5,3	53

Source: www.eurostat.com

 lowest values
 highest values

[1] - Gross domestic produkt (GDP) per capita in Purchasing Power Standards (PPS) 2005 (EU 25 = 100%)

[2] - Employment rate (%) 2005

[3] - Dispersion of regional employment rates 2005 (zero - the smallest dispersion)

[4] - Hourly labour costs (EUR) 2005 - * 2004

[5] - Monthly labour costs (EUR) 2005 - * 2004

[6] - Unemployment rate (%) 2005

[7] - Long-term unemployment rate (12 months +) (%) 2005

[8] - Public expenditure on labour market police measures (%) 2005 - as % of GDP

[9] - Gross domestic expenditure on Research and Development (%) 2005 - as % of GDP

[10] - High-tech export (%) 2004 - exports of high technology products as a share of total exports

[11] - Life-long learning (%) 2005 - % of the adult population (25-64) participating in education and training

[12] - Level of internet access - households (%) 2006 - % of households who have internet access at home

SLOVENSKO A ANALÝZA JEHO DISPARÍT

Zhrnutie

Medzi najdôležitejšie disparity v rámci konvergencie SR ku krajinám bývalej EÚ-15 je možné zaradiť najmä nízku výkonnosť (v zmysle HDP na obyv. v PKS), ktorá predstavuje iba 57,1% priemeru krajín EÚ-25, nízku pridanú hodnotu, nízku produktivitu práce a vysokú energetickú náročnosť ekonomiky (410% priemeru krajín EÚ-15). Druhou významnou skutočnosťou je nízka miera zamestnanosti v SR - 57,7% (piata najnižšia v EÚ-25, najviac Dánsko 75,9% a Holandsko 73,2%) a vysoká miera nezamestnanosti (16,3%). Navyše je nezamestnanosť výrazne poznačená vôbec najvyššou mierou dlhodobej nezamestnanosti v EÚ-25 až 11,7%.

Naopak medzi faktory rozvoja SR patrí vysoká dynamika hospodárskeho rastu. Hospodárska politika sa orientuje na podporu lepšieho využitia tradičných faktorov ekonomického rastu postavených najmä na využívaní práce a kapitálu prostredníctvom nižších fixných nákladov, prebytku pracovnej sily, disponibilite a nízkej cene priemyselných plôch, netrhových výhodách (investičné stimuly) a pod.

Z hľadiska regionálnych disparít v rámci SR sa nachádza na jednej strane rozvinutý a ekonomicky napredujúci „západ“ s dominantným centrom Bratislava resp. Bratislavský kraj a na strane druhej zaostávajúci a hospodársky stagnujúci „východ“. Bratislavský kraj, ktorý v podstate predstavuje hlavné mesto Bratislava, patrí z hľadiska viacerých ukazovateľov (napr. HDP na obyv., miera nezamestnanosti a pod.) k priemeru regiónov EÚ, avšak ostatné Slovensko a najmä región Východné Slovensko sa zaradzuje medzi najmenej rozvinuté regióny EÚ (HDP na obyv. iba 39% priemeru EÚ, miera nezamestnanosti je až 24,1%).

Na celkovú ekonomickú výkonnosť jednotlivých regiónov pôsobí viacero faktorov, pričom niektoré je možné priamo ovplyvňovať resp. riadiť ako napr. prílev priamych zahraničných investícií (PZI), ktoré pre slovenské regióny často predstavujú prvotný impulz rozvoja. Zatiaľ čo pre Prešovský kraj ako kraj najviac investične poddimenzovaný je ich výška iba 1,7% z PZI v SR, do Bratislavského kraja smeruje až 67,1% všetkých PZI. S prílevom investícií dochádza zákonite i k rozvoju iných faktorov ako napr. výstavba infraštruktúry, ktorá je spájaná najmä s výstavbou diaľničnej siete v západnej a čiastočne i severnej časti územia Slovenska. Tieto rozvojové činitele sa prejavujú pozitívne resp. negatívne (ak absentujú v požadovanej miere) aj v iných oblastiach ako napr. miera nezamestnanosti, tržby a pridaná hodnota, ale i celková kvalita života miestneho obyvateľstva a jeho kúpyschopnosť. Celkovo možno povedať, že uvedené faktory (vysoká miera nezamestnanosti a veľký podiel dlhodobo nezamestnaných, nízky prílev PZI, nízka pridaná hodnota, absencia „veľkej“ dopravnej infraštruktúry) patria medzi rozhodujúce činitele ovplyvňujúce narastanie regionálnych disparít na Slovensku. Problémy s ich zvládnutím narastajú a ani samotná regionálna politika štátu zatiaľ nenapomáha k ich riešeniu. Z hľadiska blízkej budúcnosti je možné vysloviť predpoklad, že aj naďalej bude dochádzať k rozvoju najmä v ekonomicky najsilnejších regiónoch a regionálne rozdiely sa budú ďalej prehĺbovať.

Recenzovali: Prof. RNDr. Viliam Lauko, CSc.

Prof. RNDr. Robert Ištok, PhD.

THE USE OF THE VORONOI TESSELLATION FOR PURPOSES OF SERVICE DISTRIBUTION DISTRICTS DELIMITATION (THE EXAMPLE OF THE PREŠOV NODAL REGION)

Stela LOVACKÁ¹

Abstract: *The use of the Voronoi tessellation for purposes of geographical research is introduced in the paper. Spatial distribution of facilities providing services in rural areas has become a contentious topic for it reflects the hierarchy of settlements, relation between centre and its catchment area within the area. With the Prešov nodal region being the studied area the author will present the method of spatial tessellation depicting the closest located service provider.*

Key words: *the Prešov nodal region, the Voronoi tessellation, service delivery, spatial distribution.*

INTRODUCTION

The notion of space can be considered not only from geographical but also from mathematical, economical, sociological, legal and other points of view. Space as a mathematical unit is being analysed predominantly in geometry, providing rich source of knowledge exploitable in everyday practice. In the paper we try, in a simple form, to use the geometrical method of spatial tessellation to delimit the service distribution districts which can be used in further research, f. ex. delimiting catchment areas for purposes of local government reform.

The author considers the paper from the spatial, geographical point of view.

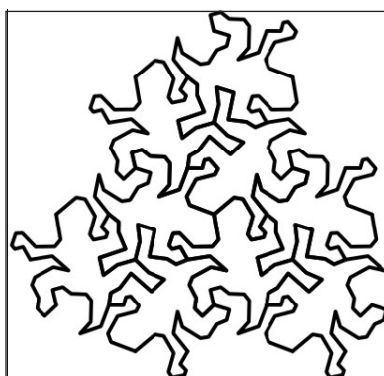
GOAL AND METHODOLOGICAL PROCEDURE

The goal of the paper is to introduce the use the method of the Voronoi tessellation in the field of geography, particularly in issues of service distribution districts. Using this method on the studied area it will be possible to analyse the districts of closest service provider.

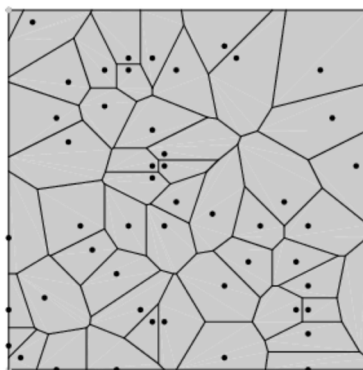
The word „tessellation“ is derived from verb „to tessellate“ which means to cover the plane with the pieces without any gaps and covers. Words synonymously used with tessellation are tiling, paving, parqueting or mosaic. We can distinguish between homogenous or heterogenous tessellation. The figure 1 (the Escher tessellation) is an example of homogenous tessellation. The figure 2 (the Voronoi tessellation) is an example of heterogenous tessellation.

1 **RNDr. Stela Lovacká, 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 klamar@unipo.sk*

Fig. 1: The Escher tessellation (the example of homogenous tessellation)

Source (Ilucová 2005)

Fig.2: The Voronoi tessellation (the example of heterogenous tessellation)

Source (Ilucová 2005)

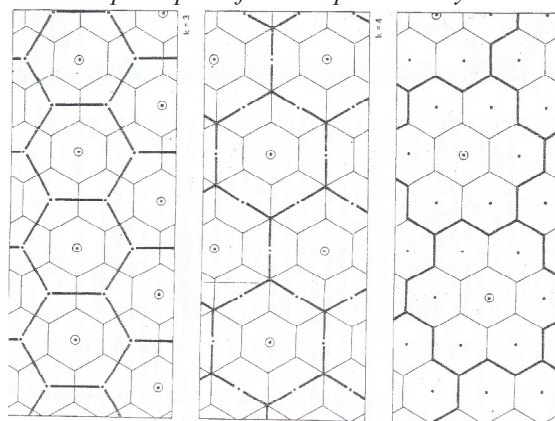
The chief principle of the Voronoi tessellation is an area (space) being divided into districts (cells). The final shape of an area consists of a set of centers to which particular parts of an area (space) are affiliated. So, the area is fragmented into a system of districts – cells entirely filling the space and having joint borders. The inside of a cell includes the points which are closer to cell's centre than to any other centre in a plane. The borders of the cells are therefore made of points of equal distance from more centres.

The programme we work with considers the coordinates of n centres in a plane input information parameters. To each point in the plane, the programme affiliates the closest centre. The points affiliating to one centre constitutes the cell.

P. Ponížil (1998) claims the idea of the space division was firstly mentioned in 1644 in Descart's work „*Le Monde de Mr Descartes, ou Le Traité de la Lumiere*“, later further explored by J. Dirichlet (1850) and G. Voronoi (1908). The author explains the ideas of tessellation were independently discovered in other scientific disciplines. In geography, the parallels of the Voronoi tessellation with central place theory can be seen. Central place theory as a theory explaining basic principles of settlement arrangement and service distribution was introduced by W. Christaller (1933). It clarifies the issues of hierarchy

of services and hierarchy of settlements. There are the two basic principles of spatial distribution of facilities – the principle of nodality (service centre – catchment area) and principle of hierarchy (various hierarchical centres). The figure 3 shows essential principles of central place theory – service principle ($k - 3$), transport principle ($k - 4$) and administrative principle ($k - 7$).

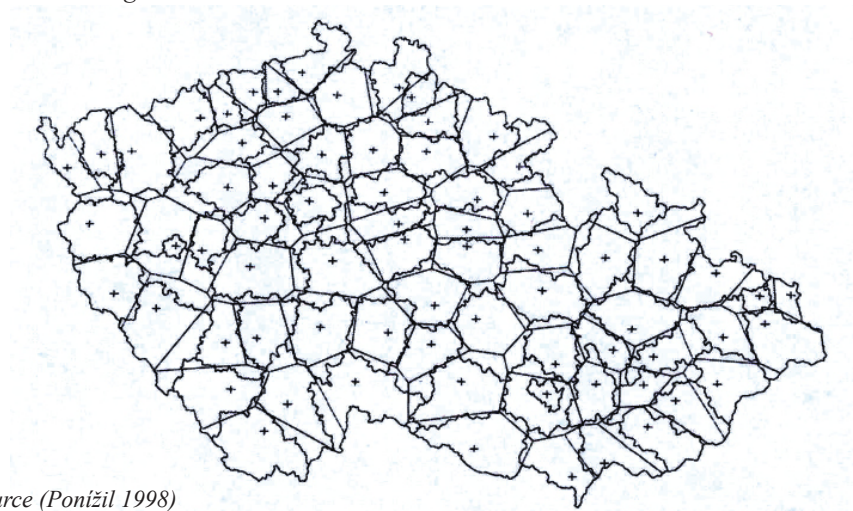
Fig. 3: *The three basic principles of central place theory*



Source (Goodall 1987)

The Voronoi tessellation can be exploitable in social sciences, f. ex. for optimisation of administrative-territorial division (figure 4) in that it compares the current existing borders of administrative-territorial units with geometrical borders using the Voronoi method (Ponížil 1998).

Fig. 4: *Administrative-territorial units of the Czech Republic and geometrical borders using the Voronoi method*



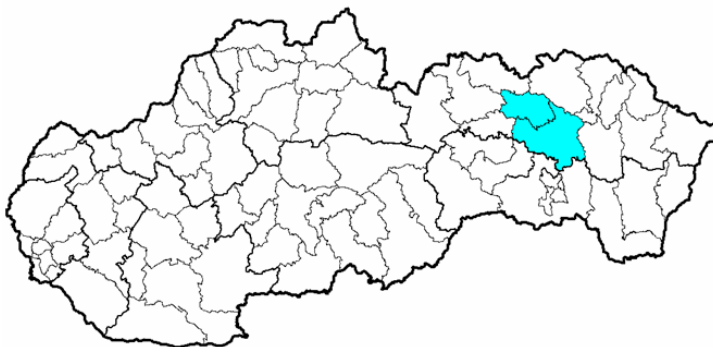
Source (Ponížil 1998)

Both the central place theory and the Voronoi tessellation operate on idealised – isotropic – environment, having common and equal features in all directions. When applying the methods to particular area the influence of relief as well as the transport communications is eliminated. It might therefore happen the programme will join communities which are not connected by any transport communication.

The spatial structure of an area limits the geographical accessibility of public and commercial services. There is a general assumption that public services must be made equally available to all (Marcuse 1978, Merget 1979 in McLafferty 1982). However, in rural areas service providers are distributed unevenly and are concentrated to certain communities. There are services with legally set districts (f. ex. postal districts, registry districts, fire and police districts) and services with no legally set districts (school, health districts). So we will point out how really existing districts vary from those constructed by the Voronoi tessellation and to what extent they are equal.

The studied area is the Prešov functional nodal region consisting of two districts – district of Prešov and district of Sabinov (figure 5). The term of functional nodal region is a purely geographical term that was introduced to Slovak geography by A. Bezák (1990, 2001). It is delimited predominantly by commute to work and school. Altogether, there are 134 communities in the studied area, four of which are considered cities – the cities of Prešov, Sabinov, Lipany and Veľký Šariš. The city of Prešov is the third largest city in Slovakia, the others are small cities having less than 10 000 inhabitants. As to communities, their size vary but, from the European point of view, they are generally small. The smallest one is Ondrášovce with 64 inhabitants, the largest is Jarovnice with more than 4500 inhabitants.

Fig. 5: *Location of the Prešov functional nodal region within Slovakia*



Source (author)

The principal asset of the Voronoi tessellation to geography is in depicting the relation of „community – closest service provider“, informing about the accessibility and nodal region for the service provider. In some literature references, the districts are called “catchment areas” (Swianiewicz 2002). The procedure of constructing the maps of closest service provider is following:

1. the choice of criterion (f. ex. pharmacy),
2. the creation of database concerning coordinates of each community of studied area

- being the first layer, and the coordinates of communities where pharmacies are located being the second layer,
3. the application software counts the closest distances and creates a mosaic (set of districts),
 4. the result is the mosaic (set of districts) of closest pharmacy for each and every community of the studied area.

DISTRICTS OF PRIMARY SCHOOLS USING THE VORONOI ESSELLATION

The service of schooling is one of the most important toll-free public services in Slovakia. Every citizen is free to choose which primary school to attend. After the competencies have been devolved from the state bodies to local government bodies since 2002, the communities as local administrative units were given a competency of primary school securement. Primary schools in rural area are exposed to many problems regarding the demographical situation. Therefore, it cannot be surprising that due to lack of students some schools will have to be closed down in the near future. What interests us now is the spatial distribution of complete primary schools (1st – 9th classes) in studied area. In September 2006, there were 57 complete primary schools in 35 communities (incl. cities). In Prešov, there were 19 complete primary schools. The average number of students attending school was 639 (incl. cities). If we omit cities, the average number of students decreased to 284 students.

Fig. 6: *Primary schools districts in the Prešov nodal region using the Voronoi essellation*



Source (author)

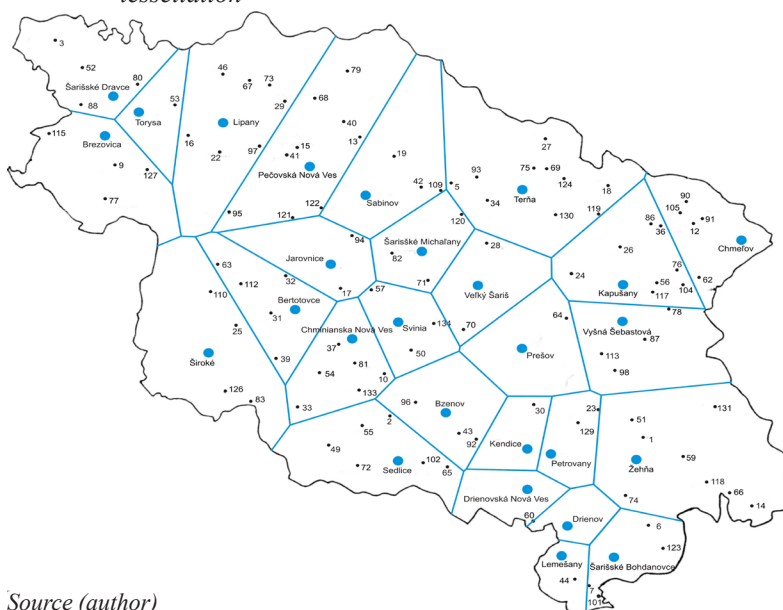
The figure 6 shows how the space (studied area) is being broken into a set of primary schools districts. We can see there are districts consisting of only one community (city of Prešov, community of Fintice and Bzenov), whereas there are districts comprising nine communities (Kapušany).

DISTRICTS OF GENERAL PRACTITIONERS (GP) USING THE VORONOI TESSELLATION

The general practitioner is free to choose in Slovakia. Recently, there has been approved a regulation of the Government of the Slovak Republic on the regionalization of the country by GPs districts. It means a person can voluntarily choose a GP, however, in case of necessity, a person belongs to legally set GP who examines them. There is also a Regulation of the Government of the Slovak Republic concerning public minimal net of health care providers in 2006 claiming their accessibility of general practitioners to 10 minutes and pediatricists to 15 minutes for 95% of population.

In the studied area, there are 72 general practitioners (46 in cities). Only 26 general practitioners are located in rural communities. The closest GP for each community is illustrated in figure 7.

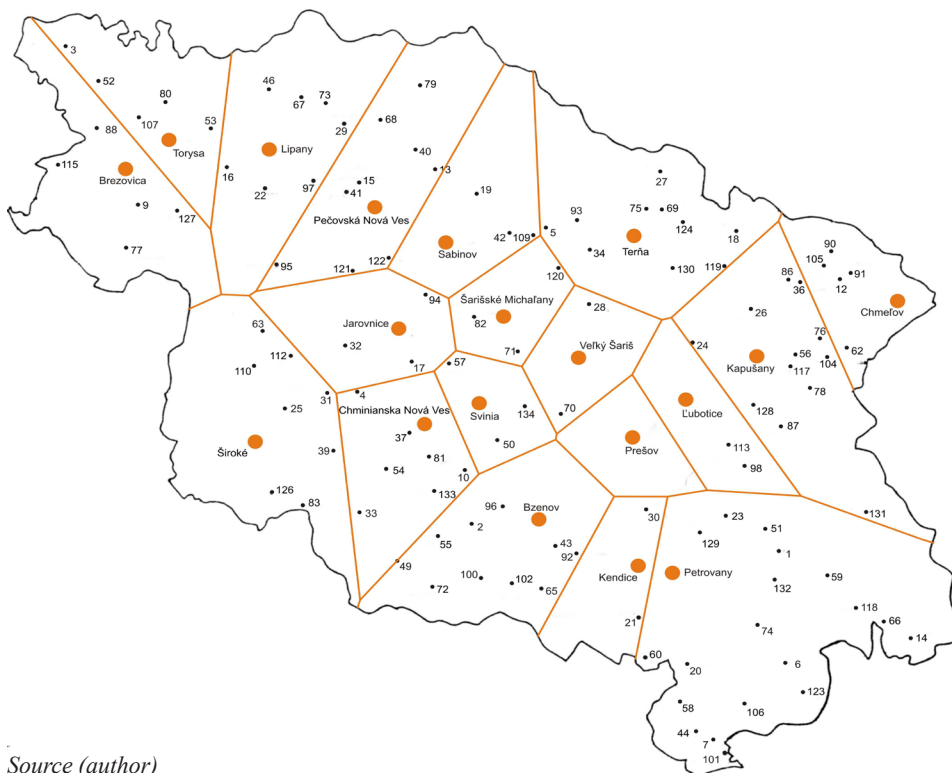
Fig. 7: *General practitioners' districts in the Prešov nodal region using the Voronoi tessellation*



Source (author)

DISTRICTS OF DENTISTS USING THE VORONOI TESSELLATION

Similarly to GPs, people in our country are free to choose the dentist. In studied area there are 90 dentists, only 17 of which are in rural communities. There are two dentists in two communities (Kapušany and Ľubotice). The relation community - closest dentist is depicted in figure 8.

Fig. 8: Districts of dentists in the Prešov nodal region using the Voronoi tessellation

Source (author)

It can be seen that the districts constructed by the Voronoi tessellation in figures 6, 7 and 8 vary in size and shape as well. The size of district is understood as the number of communities to which particular service is provided. As illustrated in figure 1, central place theory considers the regular hexagon the ideal shape for delivering services. Comparing to maps most of shapes are irregular. In addition, there are unfinished districts due to spatial constraint of border as a limiting factor. Considering researched factors, some districts are totally equal - districts with the centre in Chmeľov, Šarišské Michaľany and Svinia. Other districts differentiate. Some communities can be found exactly on the border meaning they are equally far from more than one centre. It is possible to demonstrate the districts where there are strong relations among communities, however, there are communities with no transport infrastructure connection as well. The academic attention should be paid to how to make services equal for all citizens, how to prevent certain communities from being dominant in service facilities. The results are useful for many areas of social research.

CONCLUSION

Despite the method of the Voronoi tessellation has disadvantages in terms of not respecting land relief, infrastructure, borders as limiting constraint we assume it brings a lot of information for further research or implications for service-location policies. On the

example of chosen factors (primary school, GP and dentist) - the services with no legally delimited areas, we constructed ideal districts. It could also be interesting to compare the legally delimited districts with ideal districts (f. ex. postal districts, registry districts) and, if needed, to optimise them for purposes of local administration reform.

Acknowledgement: This paper we prepared with the contribution of the grants: VEGA 1/3063/06 „Formovanie nových sociálno-ekonomických štruktúr v rurálnom a suburbánnom priestore Slovenska“, VVGS PF 12/2008/G „Geografický výskum správnej a územnej štruktúry obcí na mikroregionálnej úrovni v priestore Košického samosprávneho kraja“.

References

- BEZÁK, A. (1990): Funkčné mestské regióny v sídelnom systéme Slovenska. In Geografický časopis, 1990, 42, 1, pp. 57-73.
- BRABYN, L., SKELLY, C. (2001): Geographical Access to Services, Health (GASH): Modelling Population Access to New Zealand Public Hospitals.
<<http://www.geocomputation.org/2001/papers/brabyn.pdf>> (accessed November 2006)
- GOODALL, B. (1987): The Penguin Dictionary of Human Geography. London: Penguin Group, 1987, 509 p. ISBN 0-14-051095-8
- ILUCOVÁ, L. (2005): Escherovské teselácie
<<http://www.suma.jcmf.cz/UserFiles/0SbornikDvaDny2005.pdf>> (accessed July, 2005)
- LOVACKÁ, S. (2007): Mikroregionálne strediská a spádové obvody funkčného mestského regiónu Prešov v kontexte realizácie komunálnej reformy na Slovensku. Dizertačná práca. Prešovská univerzita: Fakulta humanitných a prírodných vied, 2007, 174 s.
- MARCUSE, P. (1978): Equal access to public services. In Proceedings of the General Education Seminar, Columbia University, 7, pp. 23-31.
- McLAFFERTY, S. (1982): Urban Structure and Geographical Access to Public Services. In Annals of the American Geographers, 1982, 72, 3, pp. 347-354
<www.blackwell-synergy.com/doi/pdf/10.1111/j.1467-8306.1982.tb01830.x> (accessed October 2006)
- MERGET, A. (1979): Equity in the distribution of municipal services. In Revitalizing Cities. In Bryce, H. J. (ed.), Lexington, Mass.: Lexington Books, pp. 161 – 191.
- PONÍŽIL, P. Prostorové teselace. Teze k rigorózní zkoušce.
<<http://www.fyzika.ft.utb.cz/voronoi/voronoi.pdf>> (accessed March 2007)
- SWIANIEWICZ, P. (ed.). (2002): Consolidation or fragmentation. The Size of Local Government in Central and Eastern Europe. 329 s. ISBN 963919451.
<<http://lgi.osi.hu/publications/2002/215/001-CF-Introduction.pdf>> (February 2006)
- Voronoi diagram. http://www-users.cs.york.ac.uk/~sok/VoronoiDiagram_1000.gif (accessed September 2007)
- website of Krajský školský úrad v Prešove <www.ksupo.sk> (accessed February 2007)
- website of Národné centrum zdravotníckych informácií <www.nczi.sk> (accessed March 2007)

VYUŽITIE VORONOIOVEJ TESELÁCIE PRE ÚČELY VYMEDZENIA OBVO- DOV DISTRIBÚCIE SLUŽIEB (PRÍKLAD NODÁLNEHO REGIÓNU PREŠOV)

Zhrnutie

Členenie priestoru na oblasti je základným princípom Voronoiovej teselácie. Výsledkom delenia priestoru touto metódou je konečná množina centier, ktorým je priradená istá časť priestoru. Týmto je priestor rozložený na systém oblastí – buniek, úplne vyplňujúcich priestor a majúcich spoločné hranice. Vnútro buniek je potom vytvorené tými bodmi priestoru, ktoré majú k danému centru bližšie ako k iným centrám. Hranice bunky sú tvorené bodmi, ktoré sú rovnako vzdialené od viacerých centier.

P. Ponížil (1998) uvádza, že prvýkrát sa myšlienka delenia priestoru vyskytla v roku 1644 v Descartovej práci „*Le Monde de Mr Descartes, ou Le Traité de la Lumiere*“. Podrobnejšie spracovanie uskutočnili J. Dirichlet (1850) a G. Voronoi (1908) (*Voronoi diagram* alebo *Voronoi tessellation*). Autor taktiež podotýka, že Voronoiove teselácie boli objavené veľakrát nezávisle na sebe v iných vedeckých disciplínach.

Naším zámerom je poukázať na ich využitie v geografii v zjednodušenej forme. Hlavný prínos Voronoiovej teselácie pre potreby geografie verejnej správy spočíva v zobrazení väzby „obec – najbližší poskytovateľ“, ktorá podáva informáciu nielen o dostupnosti, ale i o spádovom území pre príslušného poskytovateľa. Dostupnosť tejto väzby je vyjadrená súradnicovou vzdialenosťou príslušnej obce od obce, v ktorej sídli predmetný poskytovateľ. Dôležité je upozorniť na to, že aplikačný softvér, v ktorom pracujeme, má podobne ako prostredie v TCM izotropný povrch, t.j. idealizované územie, ktoré má vo všetkých smeroch tie isté vlastnosti. Vplyv takých činiteľov ako reliéf a cestné komunikácie je eliminovaný, čo je najväčšou nevýhodou pri zavádzaní tohto postupu do reálne existujúceho priestoru. V programe, s ktorým pracujeme, sú vstupnými parametrami súradnice n centier v rovine. Program priradí každému bodu roviny najbližšie centrum zo vstupného súboru n centier. Body prislúchajúce jednému centru tvoria jednu bunku.

Postup práce:

1. Výber kritéria (napr. lekárň).
2. Vytváranie databázy súradníc do počítača (všetky súradnice obcí ako prvá vrstva + súradnice obcí, ktoré sú sídlami lekární ako druhá vrstva).
3. Výpočet najbližších vzdialeností a tvorba obvodov v prostredí aplikačného softvéru.
4. Výsledkom je množina obvodov, ktoré zobrazujú najbližšie lokalizovanú lekárň pre každú obec skúmaného územia.

Takto sme vytvorili tri mapy poukazujúce na najbližšieho poskytovateľa služby základného školstva, praktického lekára pre dospelých a zubára (obrázky 6, 7 a 8) každej obce v študovanom území.

Recenzovali: Prof. RNDr. René Matlovič, PhD.
Doc. Mgr. Jaroslav Hofierka, PhD.

INFORMATION-COMMUNICATION TECHNOLOGIES AND TEACHING GEOGRAPHY

Alena MADZIKOVÁ¹, Ján KANCÍR²

Abstract: *The paper deals with the development of information-communication technologies in the teaching process. Its first part presents the current situation of informatization in Slovakia, the second part is devoted to development of information competence of the undergraduate teacher training at University of Prešov and the last part presents the main features of educational resource „Nature Science Information Service“ and its possibilities of exploitation in Geography (Homeland study) teaching.*

Key words: *information-communication technologies, Geography teaching, teacher training, information competencies, empirical research*

INTRODUCTION

Since the beginning of the 20th century, and mainly after World War II, several generations of teachers have had to cope with the introduction of new information-communication media. Besides books, other means that were first used in everyday life and consequently also in education were brought into being. Utilization of other instruments such as the voice of the teacher or a textbook is thus not anything new (Mázorová, 2004).

The development of information-communication technologies (ICT) has gone through several stages:

- 1st stage took place at the end of 1970s: first computers are delivered to some schools, mainly in Northern Europe,
- 2nd stage started with the introduction of multimedia computers which brought about a change in the view on the possibility of implementation of ICT in education,
- 3rd stage: countries of the European Union attach the key importance to joining school computers with regional, national and international networks by means of the Internet (Lukčíková, 2003).

With the development of science and technology it is important to adjust teaching to new conditions. The introduction of intensively developing information technologies acquires the innovation of teaching methods and forms. Radically changing life-style in the information society also brings about changes in education. The informative form of education does not complete its mission as it is unrealistic that students will be able to absorb the growing number of information and knowledge. The gap between the information mediated by school and the topical knowledge in the world is becoming bigger. However,

1 **PaedDr. Alena Madziková, 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: lacovali@unipo.sk

2 **Doc. RNDr. Ján Kancír, PhD.,**

Department of Natural Sciences and Technological Disciplines, Faculty of Education, University of Prešov, ul. 17. novembra 1, 081 16 Prešov, e-mail: kancir@unipo.sk

the amount of knowledge is not substantial any longer. It is more important to be able to think critically, which means to grasp an idea and investigate its starting point, compare it with the opposite opinions and gradually form one's own standpoint (Dargová, 2005).

Current understanding of education does not mean that the teacher mediates new knowledge to their pupils, but they make use of so called moving powers of the educational process. By this we understand the conflict between the tasks which are performed in teaching itself and, on the other hand, the real level of knowledge, skills and development of pupils. There is a contradiction between two sides of the same process (exercises, tasks on the one hand and looking for their solution on the other hand). Thus it is not considered a one-shot matter, but a systematic conduction of teaching (Mázorová, 2004).

In relation to the development of personality, ICT play a very important role in the effectivity of teaching. Most proponents of introducing ICT in education point out to a number of advantages for pupils: they will acquire access to various sources of information, time and space limitations will decrease and thus the individual speed of learning will be respected. ICT can help to eliminate pupils' passivity, increase their independence, stimulate their interest in learning and make the teaching process itself more pleasant. They support key competences among which computer and information literacy rank without dispute. **Computer literacy** means the ability to use computer at learning, solving various problems, information processing and to know the limits of its social functioning. **Information literacy** is the ability to use and evaluate information so that one can become an independent and whole-life learning individual. ICT are an inevitable tool in teaching when acquiring new knowledge, the Internet even connects the classroom process with a near and distant environment (Dargová, 2005).

In schools ICT are used at three levels:

- 1 In school management (school databasis, timetable development, information systems of school, school board, methodological centres and the Ministry of Education, official documents, school library information system, school presentation on WWW pages),
- 2 In administrative work of individual teachers (administration of school agenda, written preparation for teaching, other common genres),
- 3 In teaching process.

Using computers in the teaching process has a lot of advantages but it must not be forgotten that mainly when they are used intensively and for a long time it has also certain disadvantages:

- health problems can appear (eye impairments, backbone deformation, neuroses, incidentally even digitization of thinking),
- decrease of the pupil's socialization (suppression of interpersonal communication, reduction of writing and speaking),
- absence of direct observation,
- problem of pupils' development in affective, mainly emotional sphere,
- discrimination of girls (boys get to computers earlier and more easily than girls),
- limited opportunities for equal education (pupils from poor families have a lesser chance to acquire computers and programmes than pupils from rich families) (Turek, 2000).

SITUATION IN USING ICT IN SLOVAKIA

General characteristics of the situation in the field of informatization of society

In the past 15 years, Slovak economy has gone through immense changes, which have substantially changed its character. Among the three most substantial rank transformation from centrally planning to market economy, full integration into the European Union (EU) and realisation of profound structural reforms. Due to these changes Slovak economy finds itself in a new development stage with new opportunities, problems and challenges.

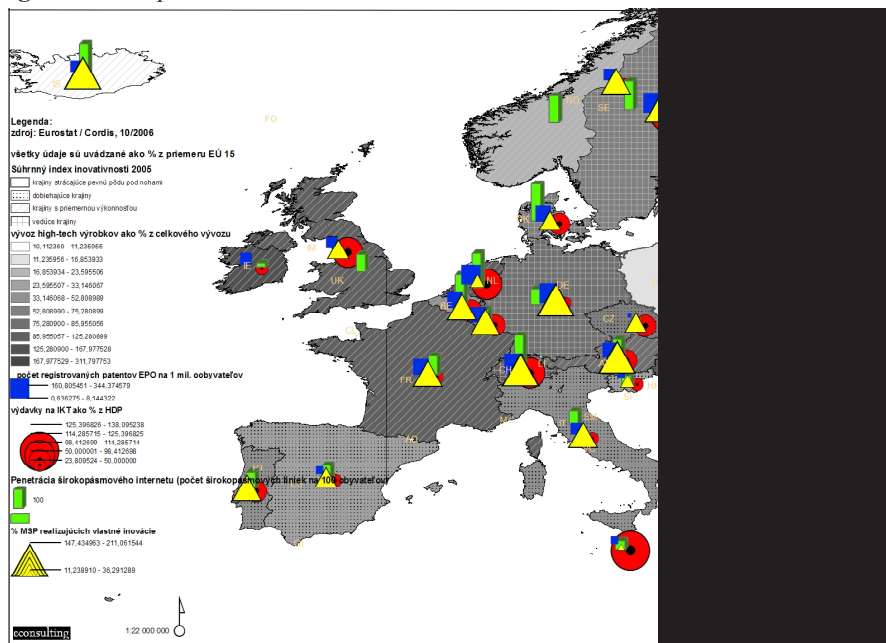
At present, Slovakia is one of the leaders among the members of the EU in realising the most important part of Lisbon strategy – structural reforms. Among the basic structural reforms that have been already carried out rank predominantly reforms in the field of economic setting such as the reform of public finances, tax reform, retirement reform and health-care reform, social system reform, and labour market reform. Economic conditions and the country's economic policy are documented today by the high economic growth, employment growth or high influx of foreign investments. The quality of the achieved economic growth on the other hand, however, documents that in the field of structural reforms aimed at the increase of influence and efficiency of knowledge oriented branches Slovakia markedly lags behind all countries of the EU. The field of the society informatization ranks among the branches in which the gap between Slovakia and the EU countries is the most distinctive.

In Slovakia today there is a fully functional market environment and quality entrepreneurial environment. Slovakia ranks together with Lithuania and Estonia among the most fast growing economies of the EU. The efficiency of Slovak economy reaches its potential level. A big part of Slovak competitiveness is, however, based mainly on the advantage of relatively low labour costs, which is a consequence of the inherited structure of industry and services, aimed predominantly at sectors with a low added value, high raw materials demand, low level of knowledge utilization, innovation and inclusion of ICT into economic and social processes. For the following medium-term period it means that the high economic growth maintenance and its reflection in a higher life quality is conditioned by the development of a qualitatively different potential of the economic growth, the potential based on knowledge. Informatization of society is a means of the development of this potential, the potential which is based on free, educated and creative people, the potential concentrated in innovative economic activities which utilize sustainable sources and produce competitive goods and services on the home and foreign markets.

ANALYSIS OF THE CURRENT SITUATION IN THE FIELD OF INFORMATIZATION IN SLOVAKIA

Slovakia is a very little and very open economy dependent on export and foreign investments. Its competitiveness in both fields is today based predominantly on comparative advantages of relatively low labour costs. In the following period, however, the competitiveness will be more and more determined by the level of knowledge utilization and its influence on innovative processes. In the field of innovation, Slovakia currently ranks among the weakest countries of the EU. The reason for this is the lack of potential of the knowledge economy which would increase the portion of innovative activities in society and would transform them in the increase of the share of Slovak high-tech products and services or in the number of registered patents.

Fig. 1: European Innovation Scoreboard 2005



Source: Eurostat/Cordis, 10/2006

The informatization of society makes a stone base of the knowledge society and investments in ICT are the most substantial sources of its innovative efficiency. Concerning the level of the informatization of society Slovakia ranks among the most backward countries in Europe. It belongs to the group of countries losing ground under their feet, respectively very slowly approaching the EU average. Slovakia heavily lags behind in the whole spectrum of more detailed views on innovation as the informatization of society is concerned. In comparison with the average of the EU countries – 15 (16) approximately 5 times fewer broadband Internet connections fall upon 100 inhabitants in Slovakia (2,9). In comparison with Finland, for instance, it is nearly 10 times less. The share of Slovak inhabitants using the Internet to communicate with public institutions (26,9) is in comparison with the EU-15 (20,8) higher (mainly in the age limit 16-54 years). But in comparison with Finland the share of the Internet population on the total number of inhabitants in all age groups is less than a half. Concerning the intensity of ICT utilization, Slovakia ranks among the countries in which the level of the users' skills is relatively low. While in the EU countries (15) 24% can use 5 out of 6 basic ICT skills, in Slovakia is only 19%. The penetration of the Internet **into enterprises** in Slovakia (90,7%) is comparable with the average of the EU-15 (90,9%). The inclusion of ICT in business processes, however, is much lower in Slovakia as only 26% of employees use a PC with the Internet as their common working means. The reasons why Slovakia lags behind the EU-15 (37%), which are much more striking in comparison with Finland (56%), do not rest so much in physical, or relatively high price of ICT as in a low technological level and quality of processes in the enterprises and their connection with ICT. The stage of

the development of information society in view of the entrepreneurial sector in Slovakia is characterized also by a low share of electronic sale revenues on the total revenues of the enterprises. In Slovakia (0,02%) the share of electronic sale on the total revenues of the enterprises with more than 10 employees is in comparison with the EU-15 (2,8%) less than a half. In comparison with Finland (10%) it is less than one tenth. Despite a high dynamic of this coefficient in highly developed countries, in the past period the Slovak Republic has not approached them more markedly.

The level of informatization in **public administration** in Slovakia is in comparison with the highly developed EU informatization countries, but also with the average of the EU-15, very low. It is documented mainly by a very low offer of electronic services. In the development of e-services Slovakia has only gone through the starting phase of the implementation of the Route map in introducing 20 electronic services of the public administration. In comparison with the average of the EU-15 countries (56%) the Slovak Republic (20%) reaches approximately a one-third level. The situation in the field of electronization of other services of eGovernment such as e.g. eLearning, eCulture, eInclusion, eWork, eHealth, or eTourism is even worse. Slovakia is one of the last EU countries in which there does not exist the system of proscriptio. Only fewer than 4% of employees, which is approximately three times less than the average of the EU-15 countries use the services of eLearning. And thus we could continue in all branches of electronic services.

The causes of a very low current level of the informatization of the society in the Slovak Republic are on the side of the offer but also on the side of demand for e-services, which is related mainly to the low penetration of the Internet in Slovakia and skills of the ICT users. The insufficient offer of electronic services, perhaps with the exception of the bank sector, is predominantly caused by the low quality of process functioning of the public administration and unavailability of a quality digital content for which the users would be willing to pay. The share of telecommunication costs on the gross national product is in Slovakia approximately on the level of the EU average. This situation, however, is not caused by a high volume of investments and costs on ICT, but mainly by their high price in comparison to the purchasing power of the inhabitants (Proposal of the information programme Informatization of society, 2006).

INFORMATION-COMMUNICATION TECHNOLOGIES IN PREGRADUAL PREPARATION OF TEACHERS

ICTs are opening up new educational dimensions. It is not meant as the substitution of the teacher at school but it is about breaking the walls among classes, schools, and isolated subjects. It means local class and school is, thanks to the Internet, more open for communication at school, among schools, at the national as well as international level. ICTs are opening up new world of education and provide the global wealth of knowledge.

Information society considers education the key item for the people to orient themselves in the influx of information, to understand, use and create it. The education in the 21st century will not be judged by an amount of information but by abilities to enrich the lesson by its effective usage. It is therefore necessary for the school to change its view on traditional teaching-learning methods. The learners are to master the methods of information processing and their application and to acquire how to learn effectively.

The role of school is to prepare the learners not only for present but also for future.

Prognoses agree that computer techniques will gain a very critical place in society development. It positively affects all actions starting with educational system management at lower level, heading teaching process, finishing with self-study and leisure time.

Despite the key competences are beyond subjects (not tied to particular contents) and are being developed at all types and school degrees, the ICTs usage at schools must, for specialisation methodologists, become a centre of attention. With the aim to make the educational programme for university preparation of future teachers more effective, the empirical research among the Prešov University students was carried out three years ago.

RESEARCH PART

Research aims and tasks

The research aim was to find out the current situation in developing information competences of students of teaching training. Considering the complexity of the research subject we focused on following issues:

- How is the level of university preparation on ICTs evaluated by students?*
- Do students know modern information sources from the field of homeland studies and geography?*
- What are their ideas about implementation of ICTs to university preparation in methodology of geography and methodology of homeland studies?*
- What are the ideas of future teachers on ICTs application in homeland studies and geography teaching at primary schools?*

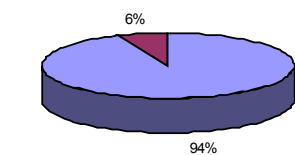
Research method and sample

The survey was conducted in March and April 2004. There were 91 students of third year of two faculties of University of Prešov - Faculty of Humanities and Natural Sciences (FHPV) (44 students) studying geography in combination and 47 of students of elementary teaching of Pedagogical faculty (PF).

There were 25 men and 66 women aged 20-25 inquired in the survey. The 64,8% of respondents finished secondary grammar school, the rest finished the technical school of various specialisation.

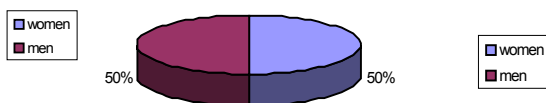
Graph 1a, b: *Structure of respondents by sex*

Structure of the PF respondents by sex

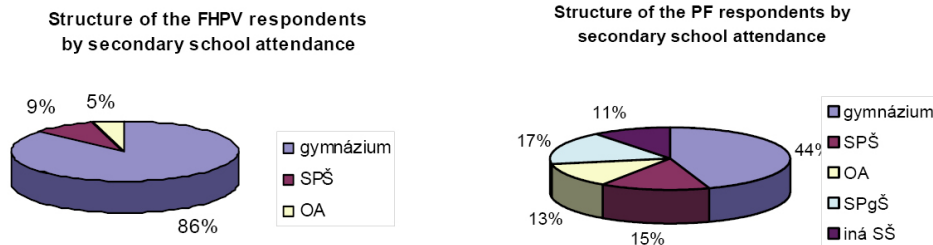


Source (authors)

Structure of the FHPV respondents by sex



Sociological data (graph 1a, b, graph 2a, b), according to faculties, show significant differences in sex and secondary school type structures (94% out of all respondents were women; more types of secondary schools structure is evident, only 44,7% of graduates were from secondary grammar schools).

Graph 2a, b: *Structure of respondents by secondary school attendance*

Source (authors)

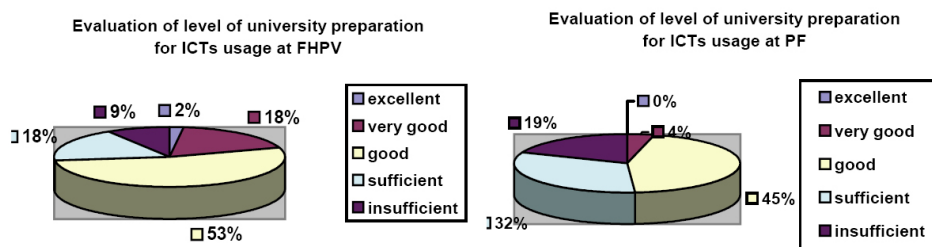
The selection of respondents was deliberate. The students of the 3rd year:

- took the course of Information sciences I, II (at PF being two semestral study) or ICTs (at FHPV almost six semestral),
- took the methodology course of subject (at PF), or have started methodology (at FHPV)
- have recognised the school environment during teaching practice.

RESULTS

Firstly, the students were to evaluate the level of university preparation for usage of ICTs in a five level attitude scale. Almost half of all (48%) expressed the middle score – 3 (good). Negative or almost negative answer was marked by 40% of respondents. The rest 12% considers it excellent or very good. Since the syllabus of Information sciences is varied due to its duration and its contents, in the graph 3 a, b the attitude scaling according to the faculties is given.

The evaluation of ICTs is, on the whole, favourable. It is thanks to the contents of the subject and the students' attitudes to ICTs (76% positively evaluated) rather than the technical facilities at classes. The most frequently criticised issues are: fast pace, lack of time, absence of individual approach, and need to expand the contents (mainly in the PF students). The students suggested creating more level groups differing in level of mastering the work with PC.

Graph 3a, b

Source (authors)

Secondly, we tried to get an overview on what particular information sources in homeland studies and geography field the students already know – predominantly on the Internet and CD/DVD applications.

When being asked to write the particular web sites with homeland studies and geographical contents, the students gave 31 different web sites. The most frequent was www.infovek.sk (19,7%). The FHPV students mentioned much more web sites (encyclopaedic summaries of world states, maps of states and regions, statistical data, data on Slovak communities, travel and tourism, weather and the like) than the PF students (the most frequent was the answer „I do not know“ – 55,3%) and a few web sites (papers, maps, world news). The special category was for the students who need the help of browsers (10%).

The overview in tables includes multimedia (CD/DVD) as well:

Tab. 1: *The FHPV respondents*

<i>Name CD/DVD</i>	<i>% share</i>
MS Encarta World Atlas	40,9
I do not know	34,1
Sčítanie obyvateľov SODB,2001 [Census 2001]	22,7
Ahoj Európa [Hello Europe]	11,4
Záhadne i zábavne o Slovensku [Mysteriously and funnily about Slovakia]	9,1
Atlas krajiny [The Atlas of Landscape]	4,5

Source (authors)

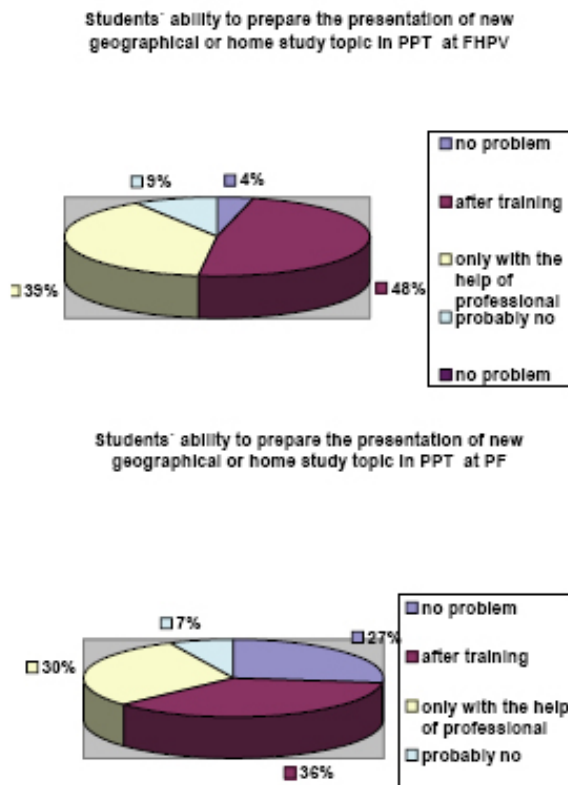
Tab. 2: *The PF respondents*

<i>Name CD/DVD</i>	<i>% share</i>
I do not know	44,7
MS Encarta World Atlas	6,4
Záhadne i zábavne o Slovensku [Mysteriously and funnily about Slovakia]	4,3

Source (authors)

Thirdly, we explored the ways of ICTs implementation to university preparation in methodologies (methodology of geography, methodology of homeland studies). Considering different contents of course on ICTs on both faculties, the different answers were thus not a surprise. Whereas the FHPV students have ICTs connected with PowerPoint presentations (15,9%), lesson plans (incl. geographical excursion, projects) – 15,9%, making the lessons more illustrative (13,6%). The first degree students are mainly interested in way of ICTs usage in individual phases of a lesson (motivation, presentation of new topic, testing, fixation and the like) – 21,3%. They consider searching, browsing and knowing about web sites important – 17%. Illustrative sketches are indicated by 8,5% of respondents. In both groups around 10% find themselves neutral (I do not know). Following graphs (4a, b) show the findings on whether the students would be able to prepare the project of the lesson in PPT.

Graph 4 a, b



Source (authors)

The last sphere our research concerns with was to map the ideas of future teachers on how to apply ICTs to geography or homeland studies teaching at primary schools. An open-ended item on perception of ways of ICTs usage in teaching process was considered as follows: general very positive evaluation (wide range of implementation) – 17,6% of respondents, concrete positive evaluation (as an information source, way of presentation, motivation, fixation and the like) – 30,8%, ICTs being a didactic tool – 16,5% (maps, clips, animations, pictures and the like). The „I do not know“ or „there are the limited ways“ answers was given by 16,5% of respondents. In order to get better idea of students' opinions we asked them to write down pros and cons of wider implementation of ICTs in geography or homeland studies teaching. Students highlighted the easy and fast approach to information (33%), livening up the process of teaching and increasing their motivation (15,4%). In their view, ICTs relieve the work and are time saving (15,4%), and modernise teaching methods (11%). The negative sides are insufficient technical equipment and limited access to computers (15,4%), danger of addiction to computers (9,8%), negative impact on personality (creativity, imagination, communication, aesthetic feeling) - 9,8%. Intriguing is that 12,1% of respondents do not know any threatening reasons connected with wider ICTs implementation at primary schools.

NATURAL SCIENCE INFORMATION SERVICE AS AN EDUCATIONAL RESOURCE CENTRE

The pervasion of information and communication technologies (ICTs) into educational – teaching process influences the education in all types and forms of schools. Despite certain limitations stemming from the children's age it also influences the education in the first degree of primary school. The dynamism of informatization process in the net of Slovak primary and secondary schools was considerably affected and supported by the INFOVEK project. The project has developed the activities to diffuse the information-communicative technologies in geography and homeland study teaching. There have appeared the first attempts - themes on how to integrate ICTs in f. ex. geography teaching (Mázorová et al., 2001, 2003). Another interesting themes are released on the official website of the INFOVEK project (www.infovek.sk) in the subject section – Geography (some materials for homeland studies are included – an example of multimedial textbook for someland studies for the 4th form).

The following part aims at a new information resource „Nature Science Information Service“ introduction and its possibilities of exploitation. It is being worked out by a group of specialists from the fields of information study and methodology of natural sciences from the Prešov University. In brief, we will try to introduce the structure of the websites with geographical and homeland study character that might be used by geography teachers as well as in the first degree of primary schools.

Thanks to multimedia potential, the teaching of particular subjects is open to completely new dimensions. Multimedia can be used throughout all phases of a lesson:

- A phase of lesson preparation
- A phase of lesson management and control
- A phase of teaching itself (explanation, practice, problem solving, etc.)

Multimedia affect all the components of a teaching process: teachers' activities, students' activities, and the contents of teaching (Fazekašová, Poráčová, Nagyová, Mižura, 2000).

NATURAL SCIENCE INFORMATION SERVICE – GEOGRAPHY (HOMELAND STUDY)

<http://naturescience.fhpv.unipo.sk/geografia/indexge.htm>

In the above address, the web pages of various disciplines can be found – biology, ecology, physics, chemistry, and geography. The introductory website for geography and homeland study includes basic content structure of the web page. A more complete map of the web is as follows:

INTRODUCTION

METHODOLOGY MATERIALS

- *History of homeland study methodology*
 - *Development of methodology of geography and homeland study in Slovakia*
 - *Significant personalities*
 - *Textbooks and cartographical outputs*

- *European dimension in geographical education*
 - Geography of Europe and the EU
 - o Euroregions
 - Prerequisites for realization of European dimension in education
- *Topical problems in methodology of geography and homeland study*
 - *Local region in teaching*
 - o Test
 - o Textbooks on geography of local region
 - *Project method in geography and homeland study teaching*
 - *Humanization of geographical and homeland study education*
 - o *Motivational methods in geography and homeland study teaching at primary schools*
 - o *Tasks and exercises on creativity development in geography and homeland study at primary schools*
 - o *Samples of projects on homeland study excursions*
- *Methodology tests*
 - Sample tests

DICTIONARIES

- *Geographical and homeland study dictionary*
 - A-B, C-D, E-F, G-H, I-J, K-L, M-N, O-P, R-S, T-U, V-Z

POINTS OF INTEREST

- *The Šariš Castle hill*
 - o *Nature trail of the Šariš Castle hill*
- *Political geography*
 - o *Armed conflicts*

NEW TRENDS

- *Geographical information systems*
- *Regional Development*

BIBLIOGRAPHY

- *Publications of the Department of Geography and Regional Development*

ORGANIZATIONS

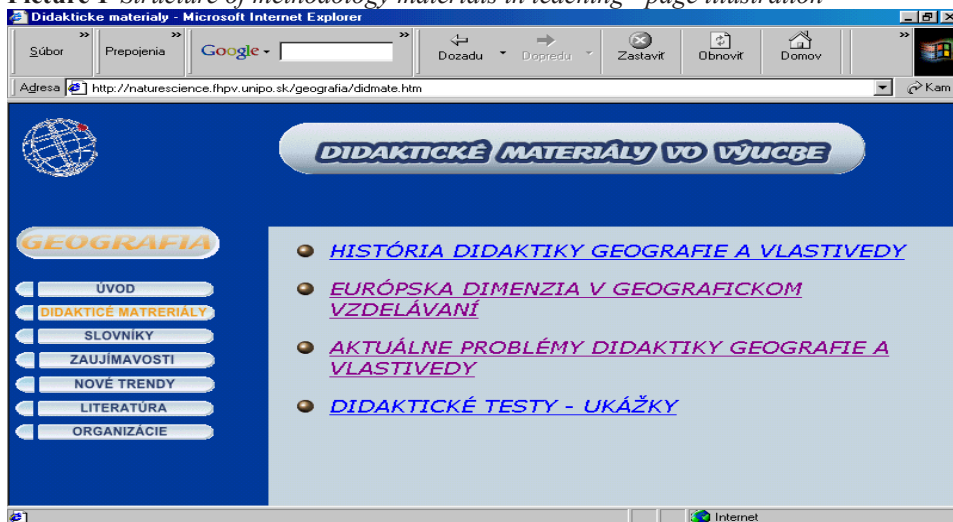
The propaedeutic subject **Homeland Study** is considered a part of geographical education at primary schools. It has, therefore, a valid place in the structure of Natural Science Information System. The field of its users is then broadening so that the students, teachers and educational workers in the first degree of primary schools can make use of it.

Methodological materials are meant for the teachers and students of geography and homeland study teaching.

History of Methodology of Homeland Study and Geography – includes a short section on history of homeland study and geography methodology, introduces the profiles of significant personalities (methodologists, authors of textbooks and methodological

devices, teachers) and provides the readers with an overview of development of textbooks and cartographical outputs too. The site is meant for further development of teachers and provides them with the information exploitable in their career growth. The profiles of significant personalities might be used in the extra activities, f. ex. for geographical Olympiad or working on geographical club activities. They also might be exploited for the sample project *Let's search for significant personalities in local region*.

Picture 1 Structure of methodology materials in teaching - page illustration



European dimension in geographical education – the page is devoted to a topical issue of *Europeanism* and its practical realization in the form of content innovation of geography teaching regarding the topics of Europe and the European Union (f. ex. working on the idea of „Europe of regions“ – it is thematically bound up to the issue of Euroregions at secondary grammar schools), the elaboration and realization of projects on foreign excursions, the preparation of quizzes, contests, and other extracurricular activities. There are photos and videogallery devoted to selected European countries and their regions.

The page on **Topical problems of Methodology of Geography and Homeland Study** consists of three closely interwoven topics:

Local region in teaching – with the sample of the test for the district rounds of geographical Olympiad for primary schools and eight year secondary grammar schools as well as the paper on content aim of *local region textbook*. This resource can be mainly exploited when test editing for so called Small Geographical Olympiad. It can be further exploited when teaching geography – mainly regional geography of the Slovak Republic – 8th form and homeland study – 3rd and 4th forms at primary schools (at secondary schools according to the particular form).

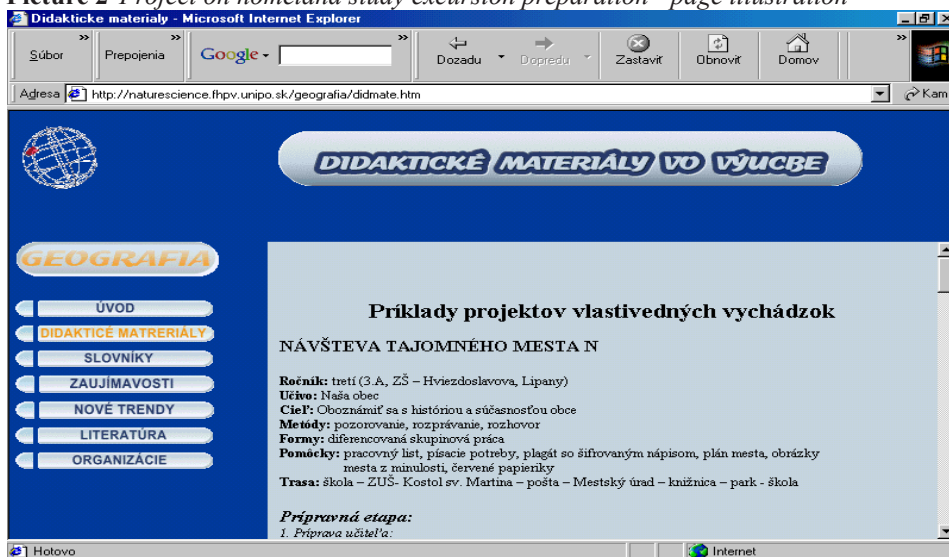
Project method in Geography and Homeland Study teaching. The page deals with the project method in geography teaching and its possibilities of exploitation. There is a procedure how to use it, the classification of the projects, the scenario of lessons using project method as well as the suggestions of projects aimed at local region.

Humanization of Geographical and Homeland Study Education. The internal division of the page is as follows:

- Motivational methods in geography and homeland study teaching at primary schools
- Tasks and exercises for creativity development in geography and homeland study at primary schools
- *Samples of projects on homeland study excursions*
- *Methodological homeland study games*

Considering the specific character and practical exploitation of **motivational methods, tasks and exercises for creativity development**, illustrations (tried in practice) of projects on homeland study excursions and methodological games, these pages are interesting predominantly for teachers in practice. They are also inspiring for the students of geography teaching in all three degrees of schools by helping them to prepare for the seminars of methodology of geography (homeland study), for the credit works, and preparing lesson projects during their teaching practice.

Picture 2 *Project on homeland study excursion preparation - page illustration*



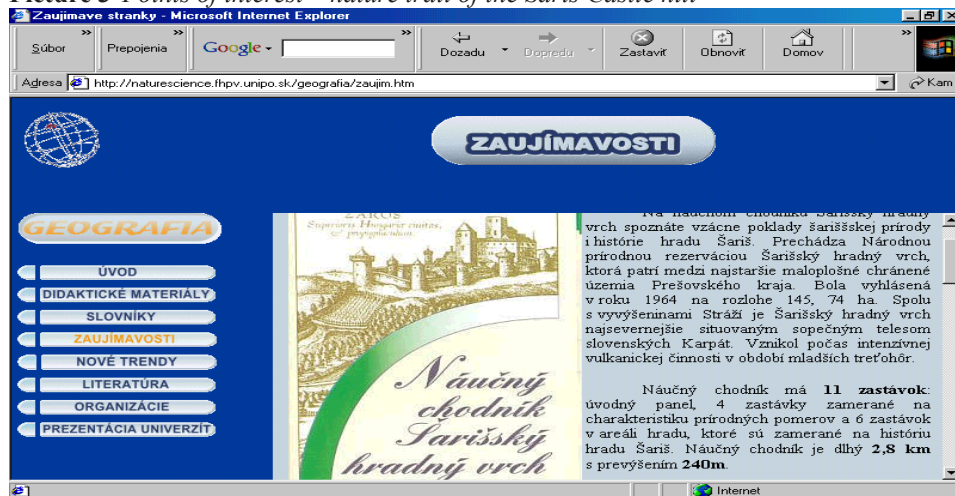
The page **Methodology tests** offers the samples of various tests, f. ex. the test on entrance exams in Geography, the standardised test on Geography for the 5th form of primary schools and 1st year of eight-years secondary schools including answer sheet and matriculation certificate. There are links to other websites the part of which are geographical methodology tests.

Another constituent in the structure of Geography Information Service are **dictionaries**. **The school geography dictionary** is devoted to the students of primary schools and is based on selected terms referring to geographical education at primary schools. The gazetteer includes the headwords of geographical names covering present world events.

One can find a link to the website of Czech dictionary of secondary school geography. The dictionaries are meant not only for the students but also for the teachers who can use the headwords when teaching (as a motivation, presentation of new topic) or in extracurricular activities.

Points of interest: Besides the links to different information resources there is also a page of *Nature trail of the Šariš Castle hill* which crosses the area of one of the five national natural reservations in the territory of the Prešov district. The information is in verbal, picture and cartographical form exploitable for planning the geographical and homeland study excursions and trips. The information material regarding certain pannels on the trail may serve as an example for concere objects illustration, phenomena and processes in physical geography teaching at secondary school. On the whole the page is interesting not only for the geographers but also for the wide public as a kind of leisure activity for getting to know the beauties of our region. The page includes the links to further resources concerning the issue.

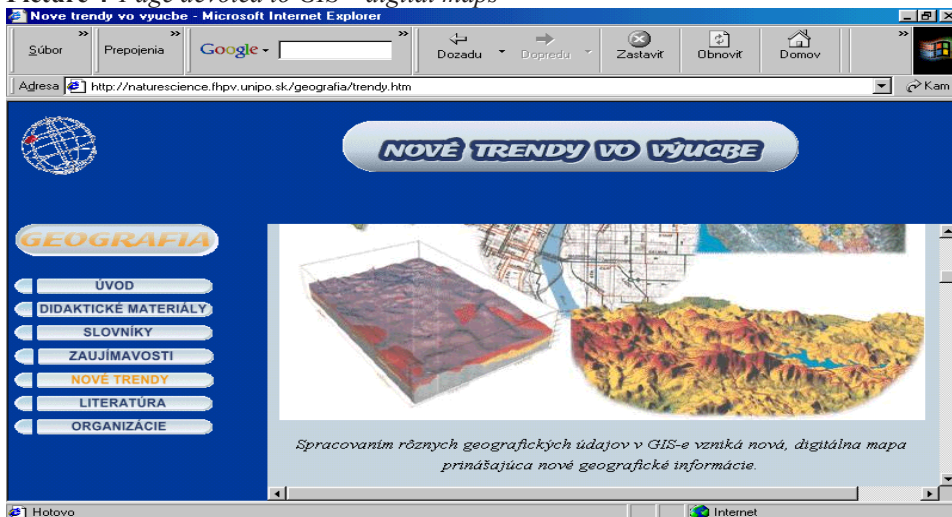
Picture 3 *Points of interest – nature trail of the Šariš Castle hill*



Political geography offers the information about *the armed conflicts* being the key source of tension in the contemporary world. The contents of the page are exploitable for the seminars in geography, school work preparation, and for geographical Olympiads.

In **New trends** section there are the topics that should contribute to the widening of teachers' professional competences. The topical issues are f. ex. *Geographical information systems*, *Regional development* and the like.

The above mentioned themes provide the readers with an issue overview giving an explanation of basic terms as well as their application in geography and social practice (f. ex. the use of geographical information systems, regional development and region development).

Picture 4 Page devoted to GIS – digital maps

Under the terms of grant task, a university textbook aimed at the analysed issue was elaborated. In the section of geography and homeland study it includes particular demonstrations of lessons projects in geography and homeland study at primary school exploiting the Internet and multimedia.

We believe that in the future we will find the way as well as human resources for completing and further composition of presented web pages. By accessing, completing, broadening and regular updating of the pages for teachers, our main objectives are to contribute to more intensive usage of the ICTs, to simplify the access to information, to modernize the educational environment, and over all to optimize the educational process in geography and homeland study.

References

- BERNÁTOVÁ, R., BERNÁT, M. (1997): Príspevok k niektorým didaktickým a informačným technológiám pre výučbu prírodných a technických vied. In: Zborník z konferencie. Nitra: PF UKF, s. 172-173.
- BÍLEK, M. (1999): Vzdálená laboratoř pro výuku chemie. In.: Pregraduální příprava a postgraduální vzdělávání učitele chemie. Ostrava: OU, s. 107-112.
- BIĽOVÁ, A., FRANKO, F., PEREČINSKÁ, V. (2003): Záujem študentov FHPV PU o predmet IKT. In: Technológia vzdelávania, príloha Slovenský učiteľ, ročník XI., č. 10, s. 4-5.
- BURGEROVÁ, J., BEISETZER, P. (2002): Metodika práce s informačnými a komunikačnými technológiami a jej psychologické aspekty. In: Prírodné vedy matematika, fyzika, technická výchova. Prešov : FHPV PU, s. 189-196.
- ČERNOCHOVÁ, M. (1998): Využití počítače při vyučování. Praha: Portál, 1998. ISBN 80-7178-272-6.

- DARGOVÁ, J. (2005): Pedagogicko-didaktické aspekty využívania IKT vo výučbe. In: Informačné a komunikačné technológie vo vzdelávaní učiteľov prírodovedných predmetov. Prešov: FHPV PU, s.80-81.
- FAZEKAŠOVÁ, D. a kol. (2005): Informačné a komunikačné technológie vo vzdelávaní učiteľov prírodovedných predmetov. Prešov: FHPV PU, 288s., ISBN 80-8068-375-1.
- KANCÍR, J., MADZIKOVÁ, A. (2004): Možnosti využitia IKT v príprave učiteľov so zameraním na vlastivedu a zemepis ZŠ. In: Pedagogický software 2004. České Budějovice, s. 79-82.
- KANCÍR, J., MADZIKOVÁ, A. (2004): Rozvíjanie informačných kompetencií v príprave učiteľov pre výučbu vlastivedy a geografie na PU v Prešove – súčasný stav a perspektívy. In: ASFHNUP, Prírodné vedy – Prírodné vedy a IKT – supplementum. Prešov: FHPV, s.150-157.
- LICHVÁROVÁ, M., MELICHERČÍK, M., RUŽIČKA, I., TOMEČEK, O. (2002): Multimédia a počítačom podporované učenie sa. Banská Bystrica : MC, 40 s. ISBN 80-8041-412-2.
- MÁZOROVÁ, H., LIKAVSKÝ, P., KAROLČÍK, Š. (2003): Integrácia informačno-komunikačných technológií do vyučovania geografie. Bratislava: Asociácia projektu Infovek, 81s.
- MÁZOROVÁ, H. a kol. (2004): Využívanie IKT vo vyučovaní biológie. Bratislava: Ústav informácií a prognóz školstva, s. 4-5.
- Návrh operačného programu Informatizácia spoločnosti, NSRR SR 2007-2013, Bratislava, 6. december 2006.
- PALA, G. (2003a): Etické dimenzie komunikácia v Internete. Prešov: GbF PU 2003. ISBN 80-8068-213-5.
- PALA, G.: (2003b) Informačné technológie v cirkevných inštitúciách. Prešov GbF PU 2003. ISBN 80-8068-214-3.
- POLČIN, D. (1997): Počítač ako pomocník a učiteľ. In.: Informatika v škole, č. 16, ÚIPŠ, Bratislava, s. 18-20.
- PORÁČOVÁ, J., TAYLOROVÁ, B., ŠUŤÁKOVÁ, I., LORINČÁKOVÁ, D. (2005): Anwendung von PC-Technologien im Unterricht einiger naturwissenschaftlichen Fächer. In: Naturwissenschaft Chemie, Book of Abstracts. Eisenstadt, s. 80.
- SHELLENBERGER, G. (1991): Didaktické funkcie počítača vo výučbe. In.: Informatika v škole, č. 4, ÚIPŠ, Bratislava, s. 15-16.
- STOFFOVÁ, V. a kol. (2001): Informatika, informačné technológie a výpočtová technika. Terminologický a výkladový slovník. Nitra: Edícia prírodovedec č. 84, UKF FPV, 230 s. ISBN 80-8050-450-4.
- TULENKOVÁ M. (2003) : Skúsenosti z využitia nových informačných a komunikačných technológií vo výučbe na gymnáziu. In: Technológia vzdelávania, roč. XI., č. 1, s. 7-.
- TUREK, I. (2003): Kľúčové kompetencie. Prešov: MPC, s.40. ISBN 80-8045-301-2.
- TUREK, I. (2000): Zvyšovanie efektívnosti vyučovania. Bratislava: Edukácia. ISBN 80-8045-89-X.

INFORMAČNO-KOMUNIKAČNÉ TECHNOLOGIE A VÝUČBA GEOGRAFIE

Zhrnutie

Od začiatku 20. storočia a predovšetkým po 2. svetovej vojne sa niekoľko generácií učiteľov muselo viackrát vysporiadať s nástupom nových informačno-komunikačných médií. Okrem kníh vznikali ďalšie prostriedky, ktoré sa najskôr začali používať v každodennom živote a následne aj vo vzdelávaní. Využívanie iných inštrumentov, ako je hlas učiteľa či učebnice teda nie je ničím novým (Mázorová, 2004).

Vývoj IKT vo vzdelávaní prešiel viacerými fázami:

1. fáza prebehla koncom 70. rokov 20. stor.: do niektorých škôl, najmä v Severnej Európe sú dodávané prvé počítače,
2. fáza nastala príchodom multimediálnych počítačov, ktoré spôsobili zmenu pohľadu na možnosť uplatnenie IKT vo vzdelávaní,
3. fáza: krajiny EÚ prisudzujú kľúčový význam pripájania školských počítačov do regionálnych, národných a medzinárodných sietí prostredníctvom internetu (Lukčíková, 2003).

S rozvojom vedy a techniky je dôležité prispôsobil vyučovanie novým podmienkam. Začlenenie intenzívne rozvíjajúcich sa informačných technológií si vyžaduje inováciu metód a foriem výučby. Radikálne meniaci sa životný štýl v informačnej spoločnosti mení aj charakter edukácie. Informatívna forma edukácie nenapĺňa jej poslanie, pretože je nereálne, aby človek vedel absorbovať stále rastúce množstvom poznatkov. Narastá množstvo i tempo poznávania. Čím ďalej, tým sa zväčšuje priepasť medzi tým, čo učí škola a tým, čo je aktuálne vo svete. Už nie je podstatné len množstvo poznatkov, ale rozhodujúce je myslieť kriticky, teda uchopiť myšlienku a skúmať jej východiska, porovnávať ju s opačnými názormi a postupne si vytvárať vlastné stanovisko (Dargová, 2005).

Novšie chápanie edukácie nespočíva v tom, že učiteľ žiakom odovzdáva nové poznatky, ale využíva tzv. hybné sily vyučovacieho procesu. Pod týmto pojmom rozumieme rozpor medzi úlohami, ktoré nastoľuje samotné vyučovanie a na druhej strane skutočnou úrovňou poznatkov, zručností a rozvoja žiakov. Podstatou hybnej sily sú protirečenia medzi dvoma stránkami toho istého procesu (cvičenia, úlohy na jednej strane a hľadanie riešení na strane druhej). Teda nejde iba o jednorázovú záležitosť, ale o systematické riadenie vyučovania (Mázorová, 2004)

IKT sú pre efektivitu výučby vo vzťahu k rozvoju osobnosti významné. Väčšina silných zástancov zavádzania IKT do vzdelávania poukazuje na množstvo výhod pre žiakov: získajú prístup k rôznym zdrojom informácií, zníži sa časové a priestorové obmedzenie, rešpektuje sa nimi individuálne tempo učenia sa. Môže sa nimi odstrániť pasivita žiakov, zvýšiť samostatnosť, stimulovať ich záujem o učenie, spríjemniť samotný vyučovací proces, podporujú kľúčové kompetencie, ku ktorým nesporne patrí počítačová a informačná gramotnosť. **Počítačová gramotnosť** znamená schopnosť využiť počítač pri učení, riešení problémov, spracovávaní informácií a poznať hranice jeho spoločenského pôsobenia. **Informačná gramotnosť** je schopnosť používať a hodnotiť informácie, aby sa človek stal samostatným a celoživotne sa učiacim jedincom. IKT sú nevyhnutným nástrojom vo výučbe pri získavaní poznatkov, ba dokonca internet spája dianie v triede s blízkym

i vzdialeným okolím. Okrem množstva výhod a nových rozšírených možností IKT so sebou prinášajú aj isté nebezpečenstvá. Nesmieme zabúdať, že IKT vo výučbe nemôžu nahradiť učiteľa. Počítač ponúka žiakom poznatky, ale lásku a city môžu dať žiakovi iba ľudské bytosti, vo výučbe učiteľa (Dargová, 2005).

IKT sa v škole využívajú v troch rovinách:

1. v administratívnom behu školy (školská databáza, tvorba rozvrhu hodín, informačný systém školy, školskej správy, metodických centier a Ministerstva školstva, úradná dokumentácia, informačný systém školskej knižnice, prezentácia školy vo forme WWW stránok),
2. v administratívnej práci jednotlivých učiteľov (vedenie učiteľskej agendy, príprava písomných podkladov na vyučovanie, bežný písomný prejav),
3. využívanie IKT vo vyučovacom procese.

Popri mnohých výhodách netreba zabúdať, že využívanie počítačov vo vyučovacom procese, najmä intenzívne a dlhodobé, má aj určité nevýhody:

- môže dôjsť k zdravotným problémom (poruchy zraku, deformácia chrbtice, neurózy, prípadne až digitalizácia myslenia),
- zníženie socializácie žiaka (potlačenie medziľudskej komunikácie, redukcie písanej a hovorenej reči),
- absencia priameho pozorovania,
- problém rozvoja žiakov v afektívnej, najmä citovej oblasti,
- znevýhodnenie dievčat (chlapci sa dostanú k počítačom skôr a ľahšie ako dievčatá),
- zníženie rovnosti šancí vzdelávať sa (žiaci z chudobných rodín majú menšiu šancu získať počítače a programy ako žiaci z bohatých rodín) (Turek, 2000).

Situácia vo využívaní IKT na Slovensku

Všeobecná charakteristika situácie v oblasti informatizácie spoločnosti

Za posledných pätnásť rokov prešla slovenská ekonomika obrovskými zmenami, ktoré zásadne zmenili jej charakter. Medzi tri najzásadnejšie patria transformácia z centrálne plánovanej na trhovú ekonomiku, plná integrácia do Európskej Únie (EÚ) a uskutočnenie hlbokých štrukturálnych reforiem. Vďaka týmto zmenám sa dnes slovenské hospodárstvo nachádza v novej vývojovej fáze s novými možnosťami, problémami a výzvami.

Slovensko je v súčasnosti jedným z lídrov spomedzi členov EÚ v naplňaní najdôležitejšej časti Lisabonskej stratégie – štrukturálnych reforiem. Medzi hlavné uskutočnené štrukturálne reformy patria predovšetkým reformy v oblasti všeobecného ekonomického prostredia, ako reforma verejných financií, daňová reforma, dôchodková reforma a reforma zdravotníctva, reforma sociálneho systému, reforma trhu práce. Stav ekonomiky a nastavenie hospodárskej politiky dokumentuje dnes vysoký hospodársky rast, nárast zamestnanosti, či vysoký príliv zahraničných investícií. Kvalita dosiahnutého ekonomického rastu však na druhej strane dokumentuje, že v oblasti štrukturálnych reforiem zameraných na zvyšovanie významu a výkonnosti vedomostne orientovaných odvetví, Slovensko výrazne zaostáva za všetkými krajinami EÚ. Oblasť informatizácie spoločnosti patrí k oblastiam, kde je priepasť medzi SR a krajinami EÚ najvýraznejšia.

Slovensko má dnes plne funkčné trhové prostredie a kvalitné podnikateľské prostredie. Slovensko patrí spolu s Litvou a Estónskom medzi najrýchlejšie rastúce ekonomiky EÚ. Výkonnosť ekonomiky Slovenska dosahuje svoju potenciálnu úroveň. Veľká časť slovenskej konkurencieschopnosti je však založená najmä na výhode relatívne nízkych nákladov na prácu, ktorá je dôsledkom zdedenej štruktúry priemyslu a služieb, zameraných predovšetkým na sektory s nízkou pridanou hodnotou, vysokou surovinovou náročnosťou, nízkou mierou využívania poznatkov, inovatívnosti a inklúzie IKT od ekonomických a sociálnych procesov. Pre nasledujúce strednodobé obdobie to znamená, že udržanie vysokého ekonomického rastu a jeho premietnutie do vyššej kvality života, je podmienené rozvojom kvalitatívne iného potenciálu ekonomického rastu. Potenciálu postaveného na vedomostiach. Informatizácia spoločnosti je prostriedkom rozvoja tohto potenciálu. Potenciálu, postaveného na slobodných, vzdelaných a kreatívnych ľuďoch. Potenciálu koncentrovaného v inovatívnych ekonomických činnostiach, ktoré využívajú udržateľné zdroje a vytvárajú konkurencieschopné tovary a služby na domácom a zahraničnom trhu.

Analýza súčasného stavu v oblasti informatizácie na Slovensku

Slovensko je veľmi malou a veľmi otvorenou ekonomikou, závislou od exportu a zahraničných investícií. Jej konkurencieschopnosť v oboch oblastiach je dnes postavená predovšetkým na komparatívnych výhodách relatívne nízkych nákladov na prácu. V nasledujúcom období však konkurencieschopnosť bude stále viac podmienená úrovňou využívania znalostí a ich vplyve na inovatívne procesy. V súčasnosti Slovensko patrí v oblasti inovatívnosti medzi najslabšie krajiny EÚ. Dôvodom je chýbajúci potenciál vedomostnej ekonomiky, ktorý by zvyšoval podiel inovačných aktivít v spoločnosti a premieňal by ich do zvyšovania podielu exportu slovenských high-tech výrobkov a služieb alebo počtu registrovaných patentov.

Informatizácia spoločnosť tvorí základný kameň vedomostnej spoločnosti a investície do IKT sú najvýraznejším zdrojom jej inovačnej výkonnosti. V úrovni informatizácie spoločnosti patrí Slovensko k najzaostalejším krajinám Európy. Patrí do skupiny krajín strácajúcich pevnú pôdu pod nohami, resp. veľmi pomaly dobiehajúcich priemer EÚ. Slovensko výrazne zaostáva v celom spektre detailnejších pohľadov na inovatívnosť vo väzbe na informatizáciu spoločnosti. V porovnaní s priemerom krajín EÚ-15 (16,5) pripadá na 100 obyvateľov v SR (2,9) približne 5 krát menej prípojek na širokopásmový internet. V porovnaní napr. s Fínskom je to takmer 10 krát menej. Podiel slovenských občanov využívajúcich internet na komunikáciu a vybavovanie svojich záležitostí s verejnými inštitúciami (26,9%) je v porovnaní s EÚ-15 (20,8%) vyšší (najmä vo vekovej hranici 16-54 rokov). No v porovnaní s Fínskom je podiel internetovej populácie na celkovom počte obyvateľstva vo všetkých vekových skupinách menší ako polovičný. Z hľadiska intenzity využívania IKT patrí Slovensko ku krajinám v ktorých je úroveň zručností používateľov relatívne nízka. Kým v krajinách EÚ-15 ovláda 5 zo 6 základných IKT zručností 24% používateľov, tak v SR je to iba 19%.

Príčiny súčasnej veľmi nízkej úrovne informatizácie spoločnosti v SR sú tak na strane ponuky, ako aj dopytu po e-službách, súvisiacemu hlavne s nízkou penetráciou internetu v SR a zručnosťami používateľov IKT. Nedostatočná ponuka elektronických služieb, snáď s výnimkou bankového sektora je daná predovšetkým nízkou kvalitou procesného fungovania verejnej správy a nedostupnosťou kvalitného digitálneho obsahu, za ktorý

by boli ochotní používatelia platiť. Podiel telekomunikačných nákladov na HDP je v SR približne na úrovni priemeru EÚ. Tento stav však nie je spôsobený vysokým objemom investícií a nákladov na IKT, ale predovšetkým vysokou cenou na ich obstaranie v porovnaní s kúpnu silou obyvateľstva (Návrh operačného programu Informatizácia spoločnosti, 2006).

IKT v pregraduálnej príprave učiteľov

Cieľom nášho prieskumu bolo zistiť, aký je súčasný stav v rozvíjaní informačných kompetencií študentov učiteľstva. Vzhľadom na zložitosť predmetu skúmania sme sa zamerali na získanie primárnej informácie v nasledujúcich oblastiach:

- a) *Ako hodnotia úroveň vysokoškolskej prípravy na využívanie IKT študenti?*
- b) *Poznajú študenti moderné informačné zdroje so zameraním na vlastivedný resp. geografický obsah?*
- c) *Aké sú ich predstavy o implementácii IKT do vysokoškolskej prípravy v didaktike geografie resp. vlastivedy?*
- d) *Aké sú predstavy budúcich učiteľov o aplikácii IKT vo vyučovaní vlastivedy resp. geografie na ZŠ?*

Do dotazníkového prieskumu, ktorý sme realizovali v mesiacoch marec - apríl 2004, bolo zapojených 91 študentov 3. ročníka dvoch fakúlt Prešovskej univerzity – 44 študentov FHPV, ktorí majú v študijnej aprobácii geografiu a 47 študentov učiteľstva pre 1. stupeň základnej školy z PF PU.

Do výberu respondentov sme zámerne zahrnuli študentov 3. ročníka z týchto dôvodov:

- ❖ absolvovali predmet Informatika I, II (na PF dvojsemestrálne štúdium), resp. IKT (na FHPV takmer celé šesťsemestrálne štúdium),
- ❖ absolvovali štúdium didaktiky predmetu (na PF), resp. začali štúdium odborovej didaktiky na FHPV,
- ❖ mali možnosť spoznať prostredie škôl v rámci pedagogickej praxe.

Interpretácia výsledkov: V prvej oblasti prieskumu, pri hodnotení úrovne vysokoškolskej prípravy na využívanie IKT takmer polovica respondentov (48%) použila z 5-úrovňovej hodnotiacej škály hodnotenie ležiace v jej strede - dobre (3). Negatívne a skôr negatívne sa vyjadrilo 40% respondentov. Zvyšných 12% ju hodnotí pozitívne ako výbornú alebo veľmi dobrú. Celkovo vyznieva hodnotenie úrovne IKT priaznivo. Zrejme viac ako technické zabezpečenie disciplíny (pozitívne hodnotené 76% respondentov) sa na ňom podieľalo hodnotenie obsahovej náplne predmetu ale aj celkový postoj študentov k IKT. K najčastejšie kritizovaným skutočnostiam patrili: rýchle tempo, nedostatok času, absencia individuálneho prístupu zohľadňujúca záujem (aj nezáujem) študentov a ich dosiahnutú zručnosť v práci s IKT, potreba rozšírenia obsahu (najmä u študentov PF). Medzi návrhmi sa viackrát objavila myšlienka vytvorenia rôznych úrovnových skupín podľa stupňa ovládania práce s PC.

V druhej oblasti nášho prieskumu sme sa snažili získať prehľad o tom, aké konkrétne informačné zdroje so zameraním na vlastivedný, resp. geografický obsah vzdelávania študenti poznajú – zaujímal nás najmä internet a CD/DVD aplikácie.

Na požiadavku uviesť konkrétne web stránky s vlastivedným resp. geografickým

obsahom uviedli študenti 31 rôznych web stránok. Najfrekvencovanejšie sa objavovala stránka www.infovek.sk (19,7 %). Výber web stránok u respondentov FHPV bol značne diverzifikovaný (stránky obsahujúce encyklopedické prehľady jednotlivých štátov sveta, mapy štátov a regiónov sveta, štatistické údaje, údaje o obciach SR, o cestovnom ruchu, o počasí a pod.). V odpovediach študentov PF sa najčastejšie vyskytla odpoveď „nepoznám“ (55,3 %) a zopár stránok (referáty, mapy, aktuality zo sveta). Zvláštnu kategóriu predstavujú odpovede študentov, ktorí si nevedeli spomenúť na konkrétnu web stránku, ale našli by ju pomocou vyhľadávačov (10 % respondentov).

Tretou oblasťou nášho zisťovania boli možnosti implementácie IKT do vysokoškolskej prípravy v odborových didaktikách (didaktika geografie, resp. vlastivedy). Vzhľadom na odlišný rozsah aj obsah výučby IKT na oboch fakultách nás neprekvapila istá odlišnosť aj v odpovediach respondentov. Kým študenti FHPV si využitie IKT spájajú s prezentáciami v POWER POINTE (15,9 %), s prípravami na vyučovaciu hodinu (vrátane geografických vychádzok, projektov) – 15,9%, s väčšou názornosťou spojenou s využívaním multimediálnych prvkov (13,6 %); budúcich učiteľov na prvom stupni ZŠ zaujíma predovšetkým spôsob využitia IKT v jednotlivých fázach vyučovacej hodiny (motivácia, sprístupňovanie nového učiva, testovanie, fixácia poznatkov a pod.) – 21,3 %. Za významné považujú tiež vyhľadávanie potrebných informácií na internete a poznanie web stránok s vlastivedným obsahom – 17 % respondentov. Názorné ukážky spája s IKT v didaktike vlastivedy 8,5 % respondentov. V obidvoch skupinách sa asi 10 % študentov k tejto otázke vyjadrilo neutrálne (neviem). Na ilustráciu uvádzame grafické vyhodnotenie odpovedí študentov na otázku, či by boli schopní pripraviť projekt vyučovacej hodiny v POWER POINTE.

Poslednou oblasťou nášho zisťovania bolo mapovanie predstáv budúcich učiteľov o aplikácii IKT do vyučovacieho predmetu vlastiveda, resp. zemepis na ZŠ. Na otvorenú položku zameranú na vnímanie možností využitia IKT v procese vyučovania sa obidve skupiny respondentov vyjadrili nasledovne: veľmi všeobecné pozitívne hodnotenie (široké možnosti uplatnenia) uviedlo 17,6 % respondentov; konkretizované pozitívne hodnotenie (ako zdroj informácií, pri prezentácii, motivácii, pri fixácii poznatkov a pod.) uviedlo 30,8 %; ako didaktickú pomôcku vníma IKT 16,5% respondentov (ukážky máp, klipy, animácie, obrázky a pod.). Odpoveď „neviem“, príp. „možnosti sú, ale obmedzené“ sa objavila u 16,5% opýtaných. Na získanie lepšej predstavy o názoroch študentov sme ich požiadali, aby uviedli pozitíva a negatíva širšieho zavádzania IKT do vyučovania vlastivedy, resp. zemepisu. Najväčšiu zhodu názorov na pozitíva IKT sme zaznamenali v ľahkom a rýchlom prístupe k informáciám (33 %), v spestrení vyučovania a zvýšení motivácie žiakov (15,4 %), v uľahčení práce a úspore času (15,4 %), v modernizácii učebných metód spojených s lepšou vizualizáciou (11 %). Za hlavné negatívum považujú respondenti nedostatočné technické vybavenie a s ním spojený obmedzený prístup k počítačom (15,4 %), na nebezpečie vzniku závislosti na počítačoch poukazuje 9,8% respondentov, na negatívny vplyv na rozvoj iných stránok osobnosti (tvorivosť, predstavivosť, komunikácia, estetické cítenie) upozorňuje 9,8% respondentov. Zaujímavé je tiež zistenie, že 12,1 % respondentov nepozná žiadne negatíva, ktoré by hrozili v súvislosti so širším zavádzaním IKT do vyučovania na ZŠ.

Zistené rezervy odhaľujú skutočnosť, že študijné predmety z oblasti IKT v rámci všeobecného základu učiteľského štúdia reálne nemôžu poskytnúť dostatočnú bázu na využívanie informačných zdrojov a aplikačných programov pre obsah konkrétnych

vyučovacích predmetov na základných ale aj stredných školách. Tu je priestor pre odbornové a predmetové didaktiky. Kým sa ho nezmocnia, proces vysokoškolskej prípravy budúcich učiteľov nebude v predmetnej oblasti primerane optimalizovaný, ale ponechaný skôr na individuálny, často metodicky menej dôsledne prepracovaný, niekedy až voluntaristický prístup učiteľa k využívaniu IKT vo vzdelávaní v rámci svojho vyučovacieho predmetu.

Prírodovedný informačný servis ako edukačný zdroj

V tejto časti príspevku je stručná charakteristika prírodovedného informačného servera <http://naturescience.fhvp.unipo.sk/geografia/indexge.htm> a možnosti jeho využitia ako nového zdroja v geografickej a vlastivednej edukácii v základných a stredných školách. Je spracovávaný kolektívom odborníkov z oblasti informatiky a didaktiky prírodovedných disciplín Prešovskej univerzity.

Na informačnom serveri sa nachádzajú stránky viacerých disciplín: biológia, ekológia, fyzika, chémia a geografia. Kompletná mapa stránok venovaných geografii (a vlastivede) je spracovaná v nasledujúcej štruktúre:

ÚVOD

DIDAKTICKÉ MATERIÁLY

- *História didaktiky vlastivedy*
 - *Vývoj didaktiky geografie a vlastivedy na Slovensku*
 - *Významné osobnosti*
 - *Učebnicová a kartografická tvorba*
- *Európska dimenzia v geografickom vzdelávaní*
 - *Geografia Európy a EÚ*
 - ✓ *Euroregióny*
 - *Predpoklady pre realizáciu európskej dimenzie vo vzdelávaní*
- *Aktuálne problémy didaktiky geografie a vlastivedy*
 - *Miestny región vo vyučovaní*
 - ✓ *Test*
 - ✓ *Učebnice geografie miestneho regiónu*
 - *Projektová metóda vo vyučovaní geografie a vlastivedy*
 - *Humanizácia geografického a vlastivedného vzdelávania*
 - ✓ *Motivačné metódy vo vyučovaní vlastivedy a zemepisu na ZŠ*
 - ✓ *Úlohy a cvičenia na rozvoj kreativity vo vlastivede a zemepise ZŠ*
 - ✓ *Príklady projektov vlastivedných vychádzok*
- *Didaktické testy*
 - *Ukážky testov*

SLOVNÍKY

- *Geografický a vlastivedný slovník*
 - *A-B, C-D, E-F, G-H, I-J, K-L, M-N, O-P, R-S, T-U, V-Z*

ZAÚJÍMAVOSTI

- *Šarišský hradný vrch*
 - *Náučný chodník Šarišský hradný vrch*
- *Politická geografia*
 - *Ozbrojené konflikty*

NOVÉ TRENDY

- *Geografické informačné systémy*
- *Regionálny rozvoj*

LITERATÚRA

- *Z publikačnej činnosti Katedry geografie a regionálneho rozvoja*

ORGANIZÁCIE

V rámci grantovej úlohy bola spracovaná aj vysokoškolská učebnica zameraná na predmetnú problematiku. Tá v časti venovanej geografii a vlastivede obsahuje aj konkrétne ukážky projektov vyučovacích hodín pre vlastivedu a zemepis na ZŠ s využitím internetu a multimédií.

Recenzovali: Doc. Mgr. Jaroslav Hofierka, PhD.
PaedDr. Alica Dragulová

PLACE MARKETING PROCESS – THEORETICAL ASPECTS OF REALIZATION

Kvetoslava MATLOVIČOVÁ¹

Abstract: *This paper is dedicated to discussion about the issues of theoretical and methodological aspects of the place marketing process. Successively describe each supposable stages of a place marketing process as a certain methodological frame to apply it on various places.*

Key words: *place marketing, place marketing process, marketing information system, identity, image, branding, competitiveness of places, segmentation, targeting, positioning, place marketing mix*

INTRODUCTION

Era of globalization and time-space compression modifies the real market space into actually unlimited space and introduces intensive competition even into the areas in which it would not have been considered several decades ago. A possible way how to deal with this new situation, especially for transforming a country, is offered by marketing. Nowadays marketing can decidedly be considered as a part of our everyday life to such an extent that even though not explicitly stated, we abide implicitly by its principles. It is not considered as a separate field of study but as a multicpectral methodological tool for managing situations in private life as well as in professional life (Čichovský 2001, p. 4). Despite more than half a century of the development of marketing it still remains a challenge even for private companies that are generally regarded as specialists for marketing activities.

It is the competition spreading into other sphere of human reality that has become a very important impetus for applying marketing to places. Doubtless, even places benefit from highly sophisticated marketing activities used in private sector.

New challenges brought about by place, have started marketing research integrating various marketing approaches (e.g. Kotler et al. 1999) based not only on deep knowledge of humanities, social sciences and business, but also on understanding the complexity of its product - place. Complexity of its nature is probably the reason why a wider consensus in such a fundamental question as the definition of place marketing has not been achieved. This is the field where geography can be useful because of the fact that place is both an object of research and part of manner in which such research can be carried out (Matlovič, Matlovičová 2006).

In comparison to corporate marketing, place marketing has conceptual differences. In the past places were understood only as commodities although in reality they appear to be complex megaproducts used in numerous ways. Contemporary marketing effort is

1 **RNDr. Kvetoslava Matlovičová,**

*Department of Geography and Regional Development, Faculty of Humanities and Natural Sciences, University of Prešov, ul. 17. novembra 1, 081 16 Prešov,
e-mal kveta@unipo.sk*

focused on adjusting the tools to the complex character of places as megaproducts and does not consider place as „merely“ a commodity. Place is viewed upon as a challenging and complex heterogeneous marketing object (e.g. Clark 2002; Rainisto 2003; Kotler et al. 2002).

At present there are no doubts regarding the appropriateness of applying marketing to places. It is generally accepted that places can be offered with equal efficiency as products. Paradoxically, there is lack of a unified conception and definition of place marketing. The reasons might be that this issue is the domain of a wide variety of researchers and also the lack of terminological unity, especially in general appellation of the issue. We prefer the term place marketing and understand it as: „conscious activity aiming at improving and maintaining the position of a place in competition through relentless identification, modification and satisfaction of needs of various segments connected with the place “.

During social and economic transformation of Slovak places, this issue is still a novelty and therefore we have decided to provide a modest contribution to the discussion on possibilities and appropriateness of systematic application of marketing tools to places.

PROCESS OF PLACE MARKETING

Marketing process, in its broad complex nature, comprises heterogeneous and interrelated activities reified in a marketing plan. A very common view is, that „*planning ... resembles a ritual of calling rain. It has no influence on the wheather...*“ (Quinn in Palatková 2006, p. 173) since the surrounding conditions change too rapidly. Planning, however, represents an inevitable process of consideration about what has happened, what is happening and what may happen. It means setting and presenting the goals (Palatková 2006, p.173).

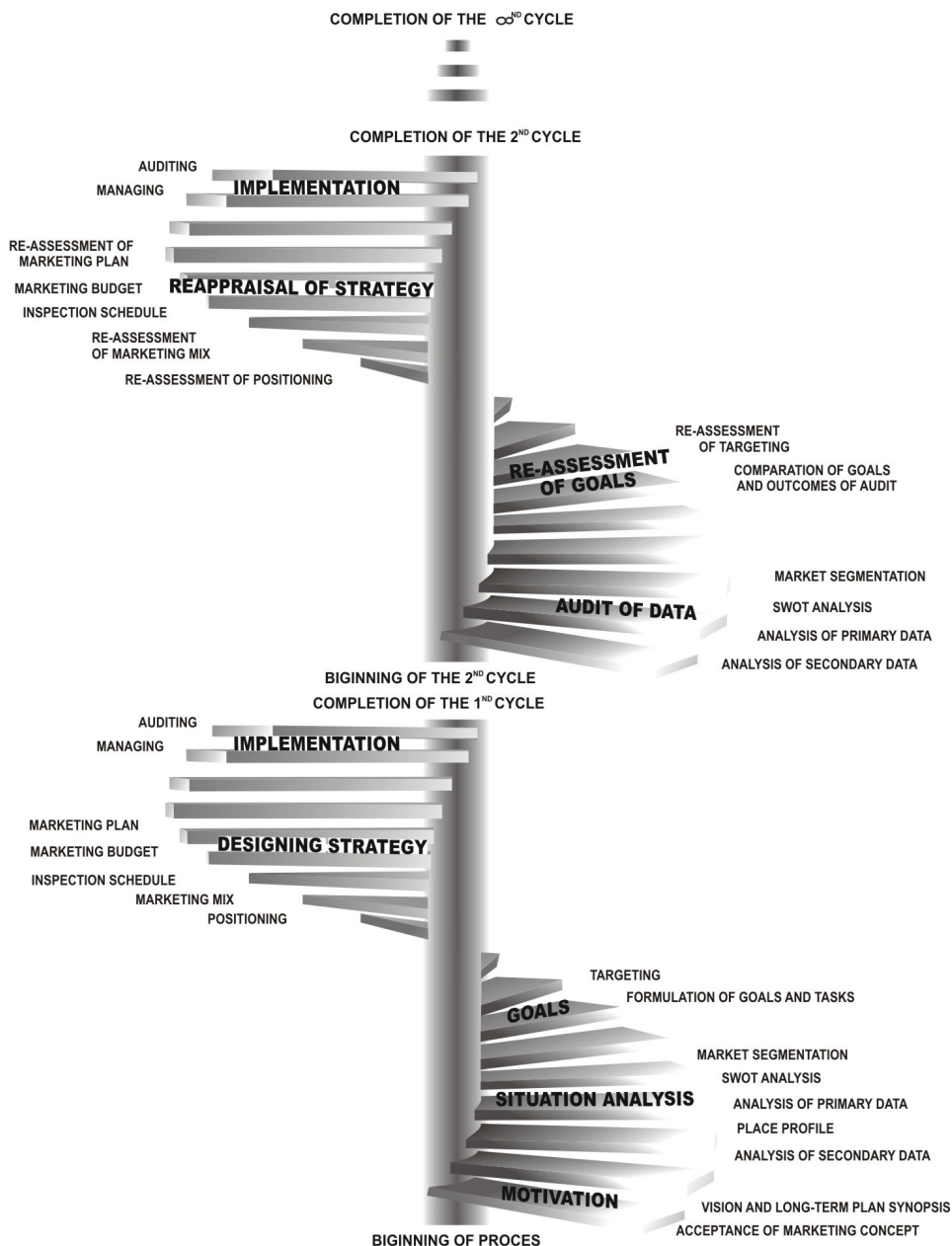
Unique and non-repetitive nature of single places directly determines differentiations and frequently does not enable even precise chronology of single stages of place marketing process. As a certain generalization of the so far successfully applied approaches, the following division into stages can be offered (see Rumpel 2002; Janečková, Vašítková 1999; Bernátová, Vaňová 2000; Pauličková 2005):

0. MOTIVATION – initial motivation, presentation of vision and synopsis of plan
1. ANALYSIS – situational analysis
2. DETERMINATION – formulating of the goals, setting and elaborating the marketing strategies
3. IMPLEMENTATION – realization, managing and auditing of marketing strategy.

Within these stages there are a number of partial activities that overlap, happen simultaneously; single places can carry them out in different sequences and if needed they can apply or skip other activities. This variability² results in complications when shown in diagrams and this eventually leads to different interpretations (compare Pauličková 2005, s 38; Bernátová, Vaňová 2000, s. 21; Ashworth, Voogd 1990, s.30; Rumpel 2002, s. 77). The process can be described as reiterative, having a feedback, cyclical and actually never-ending (Buček?, p. 81). Its nature is represented in Figure 1.

2 Especially at lower stages, at operationalization and specification of clearly set methodological sequence.

Fig. 1: Model of place marketing process



Source (author)

Spiral arrangement of single activities stresses its cyclicity and timelessness. Each cycle begins with the analysis, ends with the realization and goes through a series of planned steps³. The first cycle, as a rule, is experimental because its criteria of analysis and direction of synthesis towards marketing mix as well as towards the strategy result from estimates and prognosis with regard to other similar places and situations. Each following cycle is a qualitatively higher step of marketing activities based on concrete outcomes in a certain place and represents reiteration with regard to the determined goals based on feedback. In addition to continuous specification timelessness of the model enables us to the change completely or partially the strategy orientation even in the i-th cycle and thus adjust it to the market demands.

INITIAL MOTIVATION

At the ITF (International Travel Fair) Slovakiatour in January 2007 Exhibition in Bratislava, the representatives of towns and regions were inquired about their involvement in marketing. Surprisingly, there were relatively very few positive answers⁴. The survey showed that there has not been any considerable change since 2003 when research on the use of marketing tools in the development of places and regions in Slovakia was carried out (Pauličková 2005). As the author states: "*regional authorities rejected the idea of marketing at various levels of communication, they were uninterested in communicating about the issue and tried to divert the communication to e.g. national development program.*" (Pauličková 2005, p. 99, 92).

The above-mentioned examples clearly reveal the low level of awareness of marketing in terms of offering opportunities and being an asset to places. It is necessary to have an initiator for it to be implemented in place practice. The initiator must be able to persuade the relevant place opinion leaders about the importance of marketing for the place in question and have them as participants-multiplicators in the suggested process. The initiator's task is to arouse interest and motivate the relevant place authorities, i.e. the obligatory participants of the marketing process, so that they may accept the concept of marketing as philosophy based on successful goal achievement through meeting the customers' demands more effectively than their competitors. Regarding their decision-making competence at various levels, together with the initiator they will create an informal initiatory planning group which will design the synopsis of the marketing plan of place. In the resulting place marketing plan, the plan synopsis is the first part, the so-called outline of outcomes. Its final part is of primary importance because this is the only part actually read by the majority of managers and investors to whom the marketing plans are submitted. Therefore, this section ought to be elaborated in such a manner that it should introduce the main points of the plan and persuasively inform about its potential and likelihood of success (Clemente 2004, p. 113, 115; Rumpel 2002, pp. 77-78).

3 In the initial stage, i.e. at the very beginning the initiatory planning group introduces the marketing plan with preliminary steps that may not fully correspond to the above-mentioned model and the current number of steps may be extended or reduced. The steps are determined by the character and potential of the place and frequently, a number of activities are simultaneously in progress.

4 We did not consider as positive answers those that regarded marketing as an activity identical only with promotion.

Due to the impact of participants-multiplicators the initiatory planning group is gradually transformed into a planning group that should comprise all the relevant representatives of economic and social subjects and organizations (Rumpel 2002, p. 77). This stage includes a number of meetings and discussion forums resulting in the creation of new relationships – networking. Its objective is to coordinate the activities aiming at common interests of stakeholders and thus affect the goals of marketing. In order to eliminate conflict situations between political rivals, economic competitors and some personal enemies it is advisable to establish the post of a mediator – an impartial and independent expert in the development of places (Fussholler, Honert, Kendscheck 1995, in Rumpel 2002, p. 78). Owing to the complexity of place marketing, the lack of experts in partial areas is quite common and it is usually solved by means of outsourcing.

Motivation stage usually results in plan synopsis that is further elaborated and before the completion of the first cycle (before the proper realization) is specified and appropriately modified into marketing plan of place.

SITUATION ANALYSIS

“Before the fight in their headquarters the winners consider a large number of impacts.

Before the fight the losers in their headquarters consider a small number of impacts.

Consideration of a large number of impacts brings along victory.

Consideration of a small number of impacts brings along defeat.

This is even more relevant when not considering at all.

When I view it that way, I can only see either victory or defeat”.

(Sun 'c, 6th century AD⁵, Sun Pin 2005, p. 63; Smith 2000, p. 29)

A logical beginning of problem solving is ordinarily its anamnesis and thus with place marketing the place is subject to in-depth analysis. Situation analysis should be complex and it should comprise all that is related to place. As has already been mentioned in the preceding part, reliability of the results of such an analysis is established by means of outsourcing, i.e. by external experts, most frequently private companies.

a) Marketing information system

The essential points of every analysis are data and information⁶. Due to cyclic character of marketing management it is necessary not only to systematically collect marketing information but also to preserve, analyze and pass it onto managers or other responsible persons. The need for a marketing information system results from the necessity to provide relevant information in real time and relevant form (Janeckova, Vastikova 1999, pp. 25-38). It ought to comprise an analytical marketing system consisting of statistical procedures and models used for eliciting useful information from research data. Analytical

5 The extract has been taken from *The Complete Art of War* written by one of best Chinese past masters of war tactics and strategists. His ideas are utilized not only in modern military training but also marketing management (Smith 2000, p. 29).

6 Data – essential form of knowledge and it becomes meaningful in comparison with other data. Information – combination of data (Janečková, Vašítková 1999, p. 26).

marketing system is composed of “statistic banks”⁷ and “banks of models”⁸. Data forming the marketing system in question can be gathered from a number of sources:

- from software information systems (e.g. KORWIN, TRITHEM, OMIS, URBIS, ISOMI, ISFI, PTI), the so-called permanent internal data;
- from processing of permanent internal data designated for one use at the moment of need (e.g. analysis of municipality financing), also referred to as internal ad hoc data;
- from secondary research, i.e. from internal sources of the organization, from previous research studies carried out by the organization or from external sources (secondary research also referred to as “desktop” research”;
- from primary research gathered from field research (Janečková, Vašítková 1999, s. 26-29).

Practical outcome of marketing information system is place profile processing (Janečková, Vašítková 1999, s. 31). The most frequent way is the scheme of place description based on Hettner scheme of regional taxonomy (see Hettner 1932), which is extended by further analyses resulting from trinitary concept of place (hermeneutical and critical analysis). With regard to marketing we focus on the place characteristics as a product. Thus, its competitiveness, position on the market and its potential for further development are considered. Apart from the so-called “hard” data it is therefore important to collect and analyze information regarding the perception of place. The sources of this information are subjective and hardly measurable data, also known as “soft” data (e.g. image, quality of life, etc).

b) Identity, brand and image of place

Analysis of value and potential of a brand has recently become a non-expendable part of marketing. For many companies it is an important strategic asset whose lifespan may be longer than the product itself. No doubt branding is inevitable even with regard to places. Its form is most frequently a name, a phrase, a sign, a symbol, a picture, a musical composition, or a multimedia combination of all the listed components (Kotler, Armstrong 2004, p. 396). Applied to places it incorporates material and non-material values of a place, experience and promises for the client. As Mary Lewis puts it: “*Brand is an aura of views and expectations surrounding a product (or service) and thus makes it relevant and distinctive. It exercises influence beyond purely physical sphere and is a strong psychological element*” (Lewis 1991 in Smith 2000).

Such a broad understanding implies impossibility of measurement and evaluation of its successfulness. Despite of this Young&Rubicam agency present evaluation of brand according to two criteria: brand validity and brand caliber. Brand validity means a strong differentiation of a place brand from competitive brands while taking into account the current relevant differentiation of place brand. It achieves a necessary caliber if it is well known in source markets where it is highly esteemed by clients (Kotler 2004, p. 85).

7 *Statistic bank contains statistical procedures (e.g. multiple regression analysis) that assists in making conclusions of gathered data (Clemente 2004, p. 7).*

8 *Bank of model is a set of interconnected variables representing a certain system or process (Clemente 2004, p. 7).*

The understanding of brand cognition process by clients of place is the essence of brand equity. There are several evaluation models of brand equity, for example the Young&Rubicam agency introduces the Brand Asset Valuator (BAV) model based on research of 200 thousand consumers in 40 countries. BAV is based on four crucial elements or pillars: differentiation, relevance, esteem and knowledge. Professor Aaker understands brand equity as a set of five categories of assets and liabilities connected with a brand (the so-called Aaker's model). The categories include brand loyalty, brand knowledge, perception of quality, connotations connected with brand and other intellectual assets (e.g. patents, trade-marks and distribution relations). From other models the following ones may be mentioned: Millward Brown's brand power model - BRANDZ model, WPP's model based on BrandDynamics pyramid and Brand Resonance Model (Kotler, Keller 2007, pp. 316-319).

Branding of a place is closely connected with its image and identity. Strategy of place identity formation, brand policy and its reflection in the image are interrelated elements and it is impossible to perceive them separately. A well-communicated place brand means that people are aware of it and through brand they make certain associations with the place in question. The analysis and differentiation of brands and their impact on the final image is an important basis for the subsequent market segmentation and possible modification of identity as a set of place characteristics regarded as a marketing product. The brands and their image enable not only to identify places but they also reveal their perceived quality. It is important for places to define, analyze and then communicate their image because if they do not pay sufficient attention to this activity, a stronger subject may interfere – and that will not be branding but, on the contrary, labeling (Horvath 2006, p. 86), which may not contribute to making a place more attractive⁹. Bad perception of a place may devalue its image and may have far-reaching consequences regarding its future prosperity. These negative associations may also interfere with the future investments and activities of companies and may also have a damaging effect with regard to numerous groups of visitors, and thus contribute to the deterioration and decline of place. On the contrary, the development of brand may reverse the declining trend and may start revitalizing processes (Trueman et al. 2001, in Rainisto 2003, pp. 76-77).

Place identity results from planned activities within place marketing projects and unlike image it is regarded as an objective state of place perception. It is also considered as a sum of characteristics that differentiate one place from other ones. In addition, it represents an active part of marketing planning and it can be influenced. On the other hand, image as a result of marketing communications and also of coincidence, is a passive process. Aaker (2003, p. 60) compares identity to place and claims that „Place identity

9 The movie *Hostel* may serve as an example of labeling. It was shot by a young American director who attributed to Bratislava and its surroundings a negative rubbish dump brand of shady eccentrics, weirdos, street gangs and even groups of murderers. The movie was shot in Prague, the authors had never visited Bratislava and they did not mind the fact that the mediated information about Bratislava was not reliable. Paradoxically, that was the fact that was responsible for a massive and actually inexpensive advertising campaign of otherwise an under-average movie – at the expense of aggravated perception of not only Bratislava but also whole Slovakia by potential clients who could watch the film but did not have a chance to compare it with reality.

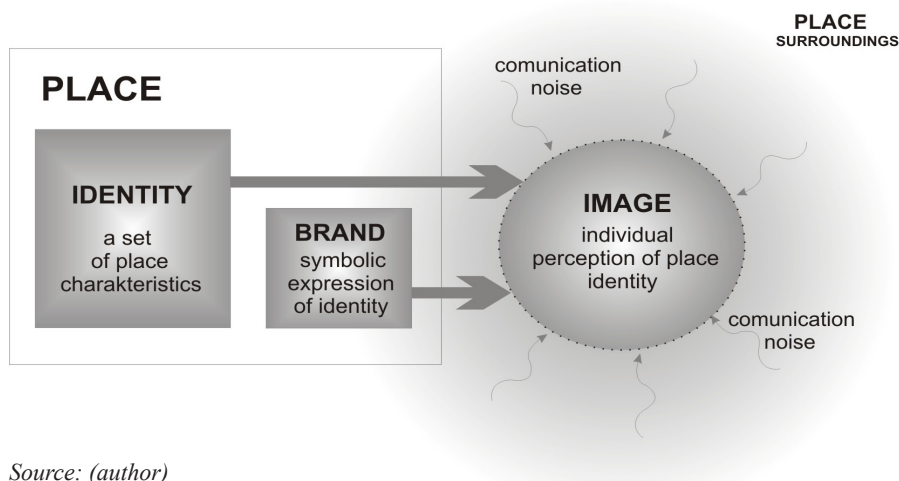
is like a place - searched for in order to be perceived. Place identity is a unique set of associations denoting a place that the management wants to create or retain. Associations represent what a place stands for and what it promises through local institutions“.

Place image unlike identity „*is a set of subjective opinions, ideas and feelings aroused by a place. Every image represents a simplification of a large number of associations and partial information related to a place... image is more than a simple belief... it is a personal perception of a place and can vary from one person to another*“ (Kotler et al. 1999, pp. 160,161, Kotler et al. 2002, p. 229).

Based on preceding characteristics it is possible to state that identity, brand and image are interrelated elements of the product - place. The differences among them are frequently perceived merely intuitively. Figure 2 illustrates how place image may be affected through place identity and place brand.

The model presents place as a transmitter of information via marketing communications (in the figure represented by means of arrows). In practise, however, the planned image is not always identical with the outcome. Nowadays, when competitiveness between places becomes stronger, forming an image is regarded as an artistic skill and, therefore it is entrusted to specialists. The final image is intentionally, but also unintentionally, affected by factors that in the figure are illustrated as the surroundings of the place. All transmitted information goes through competitive and communication noise that modifies it. Thus, that is the main reason why consistent and systematic image analyses are needed.

Fig. 2: *Model of place image formation through place identity and place brand*



Source: (author)

The most wide-spread tool for research on current place image is a semantic differential that enables to reveal the deviations of current image from the desired image. This method is based on the public perception survey based on a representative sample of respondents and on an optimised set of criteria suggested by them. The final image is then determined on the average of results and deviations from average. In case of small deviations we

speak of an unambiguous image and in opposite case of a diffused image. Even though it may appear natural that the efforts will be directed towards unambiguity, in reality, that it is not the case. A lot of places prefer a diffused image (Kotler 2001, pp 544-546). Diversity of opinions and place perception may enable places to prefer differentiated or undifferentiated segmentation strategy to concentrated strategy.

There are also other methods of measuring and evaluating image that can be applied; see e.g. Štefko (2003, pp. 79-93), who in addition to semantic differential introduces multifactorial method¹⁰, method of Parasuranam's multidimensional analytical map¹¹ and familiarity-favorability measurement. In order to obtain pertinent results it is important to apply „as many methods of image measuring as possible, to combine them and make the application most objective“ (Štefko 2003, p.79).

c) Analysis of a place competitiveness

„The pace of change is so rapid that the ability to change has become a competitive advantage“ (Richard Love, Hewlet-Packard, in Kotler 2004, p. 18). The quotation implies that the current dynamics of development puts enormous pressure on places and thus forces them to study their surroundings almost continuously and thus to identify their current and potential competitors. The probability of achieving success depends not only on the fact whether the business force corresponds with the market demands, but also on the fact whether its strength will be greater than its competitors' strength. It is insufficient merely to be able to do something. The most successful places are able to form and retain a sustainable consumer value (Kotler 2001, p. 90). Once a place becomes successful, it usually stops thinking about improving its position in the market. Such competitive myopia results in ignoring latent competitors and may eventually cause decline and decay of a place. Theodore Levitt has expressed it as follows: „If thinking is an intellectual response to a problem, then absence of a problem results in absence of thinking“ (in Kermally 2006, p. 30).

To analyze a place competitiveness means to compare it with other places on a pertinent market. If we consider the core nature of the place as a product, as a rule with a high degree of heterogeneity, not perceived by a clients as a segregated complex of services and infrastructure, but as a whole, then the analysis of place competitiveness ought to be viewed upon rather as a set of partial analyses of subproducts, which it includes. Kotler (2001, p. 227) recommends to follow the competitors' target market share, awareness of them and their popularity. With regard to the above-mentioned facts, it is almost impossible to quantify the market share of place. It might be possible by averaging positions of single place subproducts, the information value of such an indicator, however, is rather ambiguous. In order to assess the efficiency of processes in different places global rates of efficiency may be applied. Their advantage is the fact that they measure efficiency globally and consider both inputs and outputs. Their disadvantage, on the other hand, is the fact that they can

10 The results of survey are given numerical value expressing the value of image in a competitive environment (Štefko 2003, p. 87).

11 It is based on questionnaires as data sources or on structured interviewing. The outcome can be a set of two-dimensional graphs of place positions according to various evaluated features. This method enables the analysis of place position in relation to competitors by means of considering partial pairs of qualities (Štefko et al. eds. 2003, pps. 88-90).

only be applied to those products whose input/output vector is quantifiable¹². Kotler's suggestions can be successfully applied to parts of the megaproduct, e.g. to tourist product, investment product, residential product, social product, educational and cultural product, etc. Kotler further claims that along with the awareness and popularity of companies their market share increases and thus their profitability rises. Thus, regarding a place, improving the place image contributes to its rate of development, i.e. to its competitiveness.

Monitoring and analyzing other places is pertinent not only in relation to potential risk presented by competitors and thus threat to their position, but also due to inspiration by the best – in order to try to resemble them and even surpass them. This method of “confrontation with the best practice” (balance certain place against another or other better places) is referred to as benchmarking. This is a kind of barometer of place evaluating the efficiency of the exploitation of place resources while ensuring quality and value for the client (Palatková 2005, p. 110). The goal of benchmarking is to study the best practices and try to surpass them (Kotler 2001, p. 228). Frequently, in literature and practice too, rejection of benchmarking is explained by considerably different initial conditions for each case. Its application, however, does not mean copying exactly but searching for some practices that are better than the ones in use. To put in one of Motorola manager's words „*The farther from our company we find an excellent company, the better for us. We are searching for those that can do some things in an outstanding manner but they need not be our competitors*“ (Kotler 2001, p. 228).

The whole process of benchmarking application can be expressed by the following steps:

1. determination of the target subproduct and identification of variables that will be observed;
 2. finding the best places;
 3. evaluation of performance in the area in question;
 4. identification and analysis of differences in activities and methods;
 5. optimization and modification of suitable activities and methods to the conditions of the place;
 6. implementation of projected measures and monitoring of their effectivity
- (modified according to Kotler 2001, p. 228).

Apart from revealing the strong and weak points of the competitors it is also important to investigate whether the competitors duly perceive them. Some places may for example come to believe that their product fully reflects their customers' (inhabitants', investors', tourists', etc.) needs even though in reality their persuasion is not based on the results of

12 *Data envelopment analysis within global rates of technical effectivity, is based on the application of mathematical programming and enables to calculate the relative effectivity of all evaluated places with regard to producers of quantifiable goods. It identifies the most effective units in a place as well as its potential for improvement. This technique has preferred in counting the technical effectivity because, since it can take into account transformation of several inputs into several outputs, it is non-parametric and thus does not require the prices of inputs and it is not necessary to define the type of producer's behaviour in advance (maximalization of profit or minimalization of costs) (Fandel 2006).*

marketing survey but on their false idea based on inaccurate evaluation of certain signals¹³. Thus, the fact that a rival place follows false ideas may, in accordance with Kotler (2001, p. 228), be regarded as a competitive advantage.

The outcome of competition analysis need not inevitably be strengthening the market position of a place and weakening of competitors. Regarding places collaboration exploiting through competitive advantages of a place is quite common (Bernátová, Vaňová 2000, p. 28).

Similarly as in preceding parts, it is necessary to stress the need for establishing information system that ought to be regularly updated with information regarding the competitive places, i.e. it ought to provide information with respect to competitive places' strategies, goals, as well as their strong and weak points. The analysis ought to assist places in making prognosis of future activities, of procedures and responds of pertinent competitors and, subsequently, in adjusting their own goals and strategies in order to minimize the potential competitive threat.

d) SWOT analysis

After collecting and analyzing soft and hard data concerning the current place profile and marketing situation the SWOT analysis follows. It is regarded as the fundamental essential tool of situation analysis intended for designing the strategy and development programs and it has been investigated and analyzed in detail in literature. It may also be regarded as a basis implying answers to the questions: what the position of the place is and where it is heading for in future (Vašítková, Janečková 1999). Along with the increasing heterogeneity of place as a marketing product, there is a need for partial SWOT analyses (for each single market), which are in the summary of the analytical section synthesized in the form of complex SWOT analysis.

The process may be described in three steps (Janečková, Vašítková 1999):

1. delimitation of a place
2. analysis of internal factors – strengths and weaknesses of place
 - natural environment conditions
 - demography
 - economy
 - infrastructure
 - business environment
3. analysis of external factors of place – opportunities and threats
 - microenvironment
 - macroenvironment.

In case a place is a territorial and administrative unit it is necessary to carry out the analysis SWOT also with regard to its organization and qualification of its administration.

13 *For example if attendance to the local swimming pool declines, it does not necessarily mean that the public are uninterested in that kind of service – the reason may be in wrong management of that service. This situation may consequently be exploited by a rival place in such a manner that a similar swimming pool is built with such a management of service that will fully meet the clients' demands, and, eventually, be successful.*

Analysis of the place profile and chief factors is helpful with regard to defining the current situation (including strengths and weaknesses, opportunities and threats), and retrospective view of the place development, which is vital for subsequent prognosis of its future development (Janečková, Vašítková 1999).

The importance of the marketing information system is obvious at creating the SWOT analysis concept. In this context it is necessary to follow the place development trends for consequent identification of opportunities and threats. Marketing opportunities can be evaluated in terms of place attractiveness, probability of success and threats with regard to their importance and probability of occurrence.

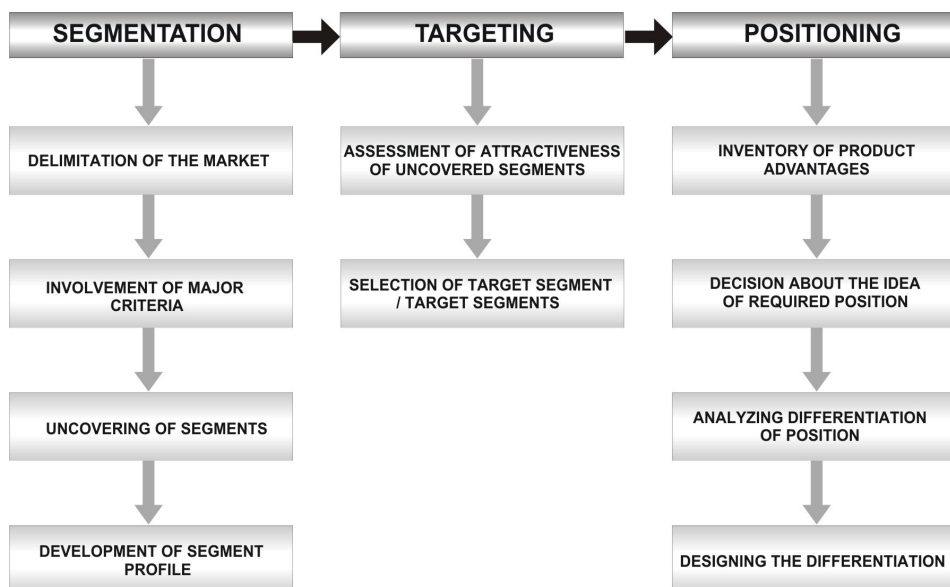
With regard to designing the SWOT analysis it is necessary to take into consideration the relative importance of single features in relation to the final goal. Bernátová and Vaňová (2000, pp. 26, 27) claim that a certain feature may become both a strong point and a weak point (e.g. occurrence of a protected carst area may be considered a strength for tourism, however, for the expansion of limestone mining or for completing transport infrastructure it may be a weakness). In principle, the strategy of further place development may be based on strengths if these cannot be eliminated by those weaknesses or threats which may either be potentially eliminated or at least reducible.

e) segmentation

Due to fierce place competition places are obliged to transfer from undifferentiated marketing to the concentrated marketing based on divergent marketing strategy (referred to as STP strategy), i.e. on market segmentation. This means that a place identifies important market segments, makes decisions, chooses those that are most suitable and applies various marketing approaches to each of them (Koudelka 2005). Concentrated marketing has three interconnected stages: segmentation – targeting – positioning (Figure 3)¹⁴ (Dziekoński, Kozielski 2006, p. 165; Koudelka 2005, pp.11-12; Kotler 2001, p. 255).

There are three interrelated treatments of market segmentation: segmentation as a state, as a strategy but also as a process. Segmentation as a state represents market diversity with regard to differentiation of consumers. Market is evaluated according to the number of existing segments, with regard to homogeneity or in case of very high segmentation, with regard to fragmented market. Segmentation can widely be viewed upon also as a strategy based on market segmentation. In this case its content is identical with concentrated marketing. After all, segmentation is most frequently understood as a process in terms of recognizing market segments in which case we try to reveal the substantial differences among place users, customers of a place. In other words, the aim of segmentation is to recognize the real market segments from which further strategic decision-making results (Koudelka 2005, p. 15).

¹⁴ In this stage of place marketing cycle both analytical and conceptual activity overlap. Therefore, targeting and positioning will be dealt with in the following part.

Fig. 3: *Concentrated marketing*

Source: (adapted according to Koudelka 2005, p. 11; Kotler 2001, p. 255; Dziekoński, Kozielski 2006, p. 165; Morrison 1995 in Palatková 2006, p. 107)

Kotler (2004, s. 333) claims that there is no unified manner of market segmentation. Workers in marketing are frequently obliged to try various segmentation methods, either as single methods or in various combinations with one another so that they may find the best overview of market structure. In case of places the complexity of segmentation increases in proportion to heterogeneity of the product. Therefore, it is rather difficult to find a universally applicable system of criteria. The most frequently occurring classification in literature sorts criteria into three essential groups: geographic, demographic, psychographic or behavioral criteria (Kotler 2004; Palatková 2006; Blažková 2005; Misiura 2006; Foret, Stávková 2003). Koudelka (2005) divides the segmentation criteria in the following manner (table 4):

Tab. 4: *Segmentation criteria*

DELIMITING SEGMENTATION CRITERIA		DESCRIPTIVE SEGMENTATION CRITERIA	
CAUSAL DELIMITING CRITERIA	UTILIZATION CRITERIA	TRADITIONAL SEGMENTATION VARIABLES	NON TRADITIONAL (PSYCHOGRAPHIC) DESCRIPTIVE VARIABLES
- REASONS FOR USE - EXPECTED VALUE - PERCEIVED VALUE - OPPORTUNITIES - ATTITUDES	- USER STATUS - RATE OF USE - FAITHFULNESS - DIFFUSION PROCESS - DECISION CONTINUUM - MANNER OF USE	- DEMOGRAPHIC - ETNOGRAPHIC - PHYSIOGRAPHIC - GEOGRAPHIC	- SOCIAL STATUS - LIFE STYLE - PERSONALITY

Source: (elaborated according to Koudelka 2005, p. 33 - 105)

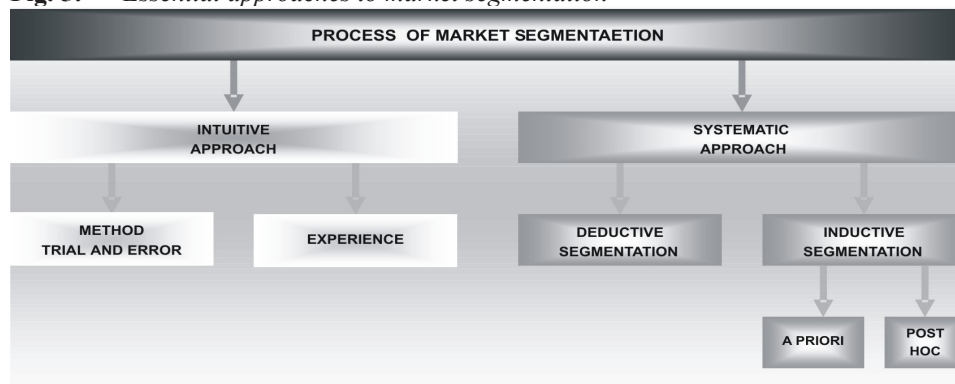
A more detailed characteristic of the criteria can be found in: Koudelka (2005), Kotler (1999, 2001, 2002, 2004), Ďaďo et al. (2006), Misiura (2006); Palatková (2006), Blažková (2005), Foret, Stávková (2003), Dziekoński, Kozielski (2006). Classification of the above-mentioned criteria should be regarded as preliminary since the groups both traditional and non-traditional complement and overlap one another. This classification has resulted from the development of segmentation process. The so-called traditional criteria were the first to be applied in segmentation, they, however, gradually tended to include into similar categories even very differently performing groups. Therefore, approximately since 1960s new, non-traditional approaches of the so-called psychographic segmentation have been applied (Koudelka 2005, s. 61).

In order for the segmentation to be effective each segment ought to fulfill certain criteria (also Smith 2000, p. 31; Kotler, Armstrong 2004, p. 351, Ďaďo et al. 2006, p. 238), it ought be: quantifiable (size and profiles of single segments ought to be measurable), stable, predictable, observable, sufficiently big, approachable (possibility for application of specially targeted communications and distribution channels and isolation from other segments), identifiable (conceptual differentiation and diversity of responses to different marketing mixes and programs), controllable (there ought to be a real chance for a place to serve certain single segments).

According to Koudelka (2005) in practice segmentation can be approached intuitively or systematically (Figure 5). Intuitive approach results from long-term experience and involvement in the market in question. Segmentation appears to take place obviously and sometimes implicitly on the level of subconscious. The decision with regard to suitable orientation, however, is conscious. Apart from "marketing intuition" also "test marketing" is frequently used in practice and in that segments are revealed on the basis of trial and error. This method may be useful in exploring imprecisions in segmentation and in increasing its effectivity. Its limits are given by foundations and frameworks since only those factors are considered that have been captured by our experience and intuition. In this case systematic approach may reveal even further existing potential sources of differentiations of the market. Deductive or inductive method may be applied. Deductive segmentation is based on the systematic approach to segmentation methods of others. Its advantage is based on relatively rapid finding of reliable criteria but at the same time it deprives us of the chance of gaining competitive advantage of a higher degree based on the capability of a better and more effective approach to the market in question. Frequently, the aspect is responsible for indicating involvement of one's own effort for identification of relevant market segments. Thus, with the inductive segmentation delimiting variables are selected and confronted with descriptive variables and relations between the delimiting criteria are observed. Within this framework there are two possible ways: a priori and post hoc (or posteriori). A priori segmentation means that a variable set in advance will decide about ranking among segmentation variables. The extent to which the consumers differ from one another will determine their allegiance to a certain segment, i.e. the nature of the segment in question is known in advance. In post hoc segmentation it is not possible to restrict the segmentation coverage. Therefore, systematic evaluation of importance of relations among all segmentation variables is necessary. The number and orientation of segments result from the analysis based on acquired segmentation data. In both segmentations it is possible to proceed forward or backward. With forward segmentation the segmentation is

exclusively or predominantly based on the criteria regarding the relation of consumers to the given category of a product. In backward segmentation segments are revealed on the basis of descriptive variables and further checked whether they are internally homogenous (based on Koudelka 2005).

Fig. 5: *Essential approaches to market segmentation*



Source: (Koudelka 2005, p. 109, 115)

FORMULATING GOALS AND DESIGNING MARKETING STRATEGIES

A victorious army must know how to achieve victory and then can start fighting.

A defeated army first starts fighting and then looks for a manner how to achieve victory....

A good leader first takes a position, in which he cannot be defeated,

But, at the same time he makes sure he will not miss the opportunity to achieve victory.

Sun-c', 6 cent. AD. (Sun-c', Sun Pin 2005, p. 76, 77)

As the above-given citation indicates, as early as in 6th century AD it was known that formulating, setting the goals and planning strategy are the precondition of every success. Unfortunately, even nowadays in the modern, advanced society it is not uncommon that strategic thinking is absent. Contemporary global environment requires from places a clearly set vision and direction if they want to be successful in a highly competitive environment (Mallya 2007, p. 16). A successful strategy will result from a detailed and systematic analysis that will respond the two fundamental questions: *where is the place situated?* and *how did it get there?* The following comparison of the whole spectrum of data and information will reveal the trends that have to be taken into account in setting the marketing goal. The essence of the conception and strategic stage could be summarized in the two questions: *where does the place want to get in future?* and *how can it be achieved?*

The complexity and ambiguity of the product of a place determines the possible differentiations in the arrangement of single activities within the marketing process. Segmentation that is sometimes a component part of conception stage may be given for illustration. Apart from analytic activities also conception activities are incorporated in it.

The chief factor shifting its position in the marketing process towards conceptional level is a wider approach to the treatment of its nature as a strategy based on market segmentation. We are inclined to accept the view according to which it is an analytical process that is fundamental in STP strategy and therefore it has been classified into the preceding stage of the cycle.

a) targeting

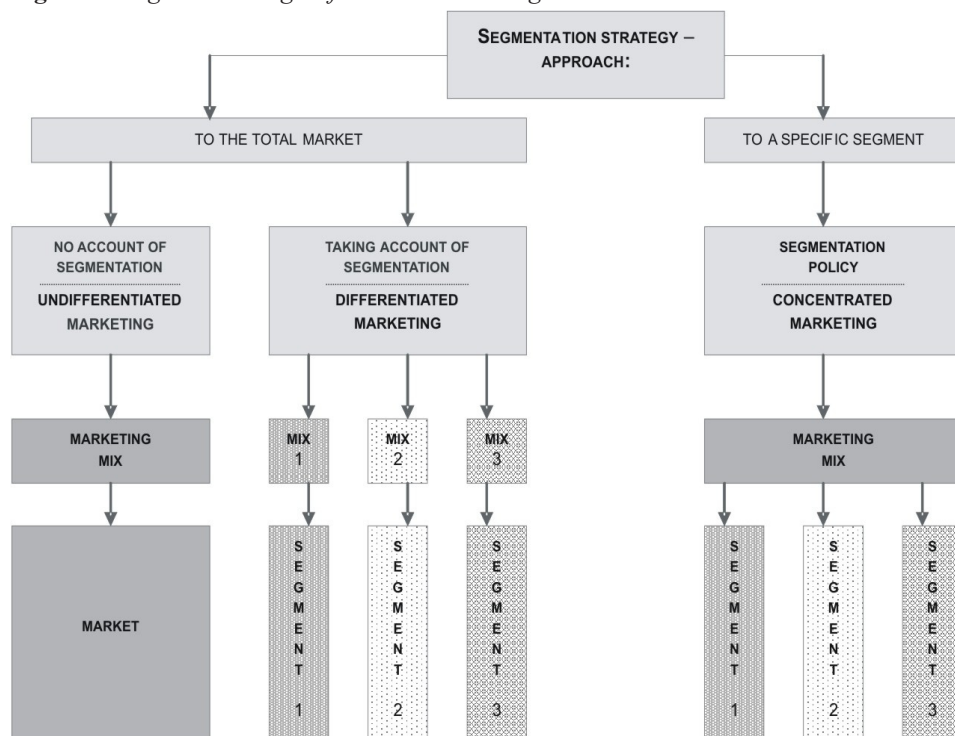
While market segmentation relative to its creation by a place itself appears to be a potentially outsourcing activity, targeting and positioning require a participative-creative approach. The essence of targeting is in the decision of a place regarding which uncovered segments are to be aimed at, i.e. which uncovered segments will become the target of the next marketing effort. The process itself consists of an evaluation and selection stage.

According to Kotler (2004) the evaluation of market segments potential is in all probability affected by three market factors: by the size of a segment and its growth, by the structural attractiveness of a segment, by the sources and targets of a place. Koudelka (2005) points out that it is proper to clarify the evaluation criteria of suitability and attractiveness for marketing bearing prior to the selection process itself. The result of the evaluation stage is a clear vision of suitable or potential target segments of a market place. The selection is in fact a decision about how many segments are going to be targeted; it is a decision about the number of the segments a place wishes to service. In other words, it is a process of selection of an appropriate strategy of segmentation. Basically, three alternatives are available: concentrated, differentiated, and undifferentiated market segmentation strategies (Fig. 6).

The undifferentiated market segment strategy or mass marketing mean the decision of a place to aim unanimously at all segments, at the whole market. The differences in the segments are here ignored and place is entering the market with undifferentiated offer aiming to appeal to the largest possible potential group of customers. Practically, it means a strong concentration of a place intended at creating a positive image. This kind of segmentation strategy with total market approach often involves competitiveness problems and that is the reason why it is being criticized nowadays. It is not as much capable of adjusting an offer to the existing segment differentiations as the differentiated and concentrated market segmentation strategies are. The differentiated segment strategy is aimed at several target segments to which an offer is adapted. Its disadvantage is comparatively high costs spent on different variations of a product. The development of different marketing programs for individual segments requires special marketing research, a prognosis, and analyses and plans to ensure their communications support. For this reason the concentrated strategy that is aimed at one selected segment or a micro segment is often preferred. Above all, if a place has at disposal a limited number of sources then it is more reasonable to target achieving a sufficient market volume in one or several market segments than to concentrate all effort upon achieving a small share in a large market. The concentrated marketing is an outstanding way how small places (according to both their size and sources) can remain competitive with larger and wealthier places and can achieve a stabile position. This strategy is not, however, without risks. A change of a segment or entering the target market by a more powerful and wealthier competitor may become a problem. Appropriate diversification of different market segments seems to be a kind of solution (according to Kotler 2004, p. 352-356; Ashwort, Voogh 1990, p. 48-50).

The selection of an appropriate segment strategy depends on many factors, primarily on the financial sources a place has at its disposal. The decision making process is often influenced by arguments about what should be targeted as well as by complexity to find answers to the questions *how?* and *why?* Brainstorming, mediation, and moderation, etc. are methods that can assist in achieving the best possible solution and consensus. In the introduction to this chapter we define targeting as a kind of participative-creative process, therefore, when making a final decision, it is vital that the real needs of target groups be taken into account. In this stage integration and harmonization of partial goals take place. They result in shaping a generally acceptable vision of development of a place. Rumpel (2002) claims that a vision as an indicative framework for a development policy of a place should not be general and full of empty phrases but concrete and understandable. He adds that it is necessary to realize that the vision may come true only when the goals of the involved participants are fulfilled. It is vital to reach the mutual coincidence of needs of the demanding party (its characteristic feature is their effort to satisfy their differentiated requirements) and the offering party, on the other hand, who attempts to maximize their profits (in the case of private entrepreneurs) or to maximize their benefits (in the case of the public sector) (Rumpel 2002, p. 80).

Fig. 6: Segment strategies for market covering



Source: (modified according to Ashworth, Voogd 1990, p.49; Kotler, Armstrong 2004)

b) positioning

Having identified a suitable target market it is necessary to ‘announce’ one’s position to the market. The process by which the final attributes of a market product are identified by its target market, i.e. the position which a product occupies in its consumers’ minds relative to the positions of competitive products, is defined as positioning (Kotler, Armstrong 2004, p. 359). It means that positioning does not reflect the real properties of a product of a place, it mirrors how the product is perceived by its consumers. In Morrison’s view (Morrison 1995 in Palatková 2006, p. 106) positioning is “...*what you are able to do with the consumer’s minds* “. In the positioning process a place explores how its product is perceived in relation to the perceptions of the competitors’ products of the same category. Multidimensional scaling seems to be here an effective and useful tool. Its output is a “positioning map” that displays product similarities and differences. It shows the relation of a product to competitive products or to the ideal (Ďaďo a kol. 2006, p. 241). A place then uses the gained information for identifying its current market position and for making decision how to proceed: whether to keep the continuum level or to make a change.

The basic feature of a product of a place that determines its specific market position is differentiation. Differentiation gives a clear answer why a consumer should choose this place’s offer; why it is better than the offerings of all other rival places. According to Myers (1996 in Ďaďo, et. 2006, p. 245) the differentiation can be authentic or non-authentic. The authentic differentiation is based on the parameters of a product (subproduct). Its advantage is an unambiguous interpretation of the results, subsequently facilitates decision making. Its disadvantages are frequent inaccuracies and incompleteness of a list of product properties through which the product is perceived by individual clients. The non-authentic differentiation is based on the evaluation of a product as a total unit. The evaluation is based on the image, the form of an offer, the price, and various other components of the marketing mix. The advantage of this approach is that the evaluation in the attribute selection process is free from subjectivity. A possible disclosure of these properties according to which the product of a place is assessed by its target customer groups may become a problem. Moreover, a situational aspect of the criteria selection and criteria perception processes cannot be excluded (a newspaper article, etc) either.

Morrison (1995 in Palatková 2006, p. 106) analyzed the product positioning process and divided it into the following five Ds:

- „documenting“, identifying product advantages;
- „deciding“, decision about the image a place wishes to create in minds of its potential customers;
- „differentiating“, the analysis of differentiation of a position relative to the position of competitive products;
- „design“, own design of product differentiation, the marketing mix design;
- „delivering“, promise fulfilling.

In the positioning process a place has also to decide about the extent of differentiation: whether to build a product profile on its most dominating attribute or to focus on its several attributes. The unique marketing proposition (UMP) supports the first alternative and suggests that it is necessary to find a unique way of marketing yourself. It has to be more

memorable, systematic and structured than everyone else's, especially in these days when the market is highly oversaturated with information and thus becomes nontransparent. However, if several places focus on the same product attribute it is crucial then to exploit the second alternative, i.e. to focus on several attributes of a product (Kotler, Armstrong 2004, p. 362-363; Palatková 2006, p. 108).

In order to make the differentiation meaningful, it is necessary that the product attribute (a characteristic feature or difference which expresses the differentiation of a product of a place) meet the following requirements:

- *product value* – extra value the product brings to the marketplace, how the product creates value for the customer;
- *product distinctiveness* – it should not be offered by competitors (if yes, then only to limited extent);
- *product uniqueness* – it should be better than the other products of the same kind on the market; it should prevail the standard; it should be different from those of your competitors';
- *required value* – a customer wants a product, perceives it; the product is targeted at him;
- *credibility* – built on facts;
- *product distinctiveness* – easily seen and communicated;
- *inimitability* – competitors cannot imitate it;
- *product availability and affordability* – it should be commonly available to a customer;
- *product profitability* or from public sector's view the capability of maximizing profit.

(Modified according to Ďaďo et. 2006, p. 245 and Kotler, Armstrong 2004, p. 363)

The above mentioned indicates several possible approaches to positioning of place which may be mutually combined (Seaton, Bennett 1996, p.114): positioning in relation to the target market, to price or quality, to the form of a product, and to competition.

In spite of the fact that there is a lot of literature reporting on the issue, positioning has been a great challenge for places. Individual places constantly attempt to differentiate their products from those of their competitors' and offer more and more new services, guarantees, special bonuses, etc. in order to attract more clients and to better satisfy their growing demands. A precise positioning strategy does not seem to be sufficient nowadays; it has also to be effectively promoted. The fundamental task in the process of marketing strategy design and its implementation (besides certain corresponding aspects in the marketing strategy design and image creation which have already been mentioned) is the production of the appropriate marketing mix.

c) concept of marketing mix

The decisive step in the marketing process is the concept of a marketing strategy and an implementation plan. The marketing strategy of a place is to be understood as a complex of partial strategies that precisely define operational policies and procedures for achieving the established goals. The marketing mix is a conceptual skeleton of general marketing.

It is based on the concept of four P's, i.e. **Product**, **Price**, **Place**, **Promotion**. These four marketing mix elements were suggested by the Canadian professor Jerome McCarthy¹⁵ at the beginning of the 1960s (Kotler 2004, p.112). In spite of its popularity it did not appear to be generally and unanimously accepted. It was criticized for being too simple and slightly out of date. The four P's model has become a 'straitjacket'. The criticism resulted in expanding the number of P's and creating 5 P's, 6 P's, 7 P's and more P's models. In consequence, it has caused the improvement of marketing mix applicability. Lautenborn (1990 in Kotler 2004, p. 114) noticed another drawback of the 4P's marketing mix. According to him it was created primarily from the seller's viewpoint without thinking of the customer. In his opinion it should be more buyer-oriented. Therefore he added one customer's C to each seller's P. *Customer Value* was added to **Product**, *Cost to the Customer* was added to **Price**, *Convenience* was added to **Place**, and *Communications* to **Promotion**. The four McCarthy's elements, however, provide almost infinite variety of interblending. The individual variables of the Mix are considered to be internal variables (they may also be a mixture of them). We can influence them as well as make decisions about them (despite the fact that we are simultaneously affected by our customers, competitors and other uninfluenced factors) (Smith 2000, p. 5). The 'xP' concept is called the Mix because all its components become effective and functional only in a mutually optimal combination. They lose their effectiveness when they are not rightly interlinked. They are complementary; they support each other when being appropriately 'blended' (Bernátová, Vaňová 2000).

In the case of places it is necessary to alter the four P's model (see Fig.7). The four fundamental marketing tools *product*¹⁶, *price*, *place*¹⁷ and *promotion* were expanded by two others **People**¹⁸ and **Process**. Mutual combinations of these variables offer an endless number of combinations that may be modified and adapted to the individual needs of each particular place.

15 Prior to him the term 'marketing mix' was coined by professor Neil H. Borden in 1948 who understood it as an sample range of harmoniously interconnected activities directed at affecting the buyer. He used an example of cake dough where a change of one ingredient, for instance sugar, may at first improve the taste of the cake but a repeated increase of a sugar dose may lead to spoiling the whole cake. He intended to emphasize the essence of the Mix, i.e. searching for mutual optimal proportions and relations. The 4 P's model was for the first time proposed by McCarthy at the beginning of the sixties of the 20th century (Foret 2006, p. 167).

16 Some authors (Palatková 2006, Morrison 1995, Kotler 2004) consider **Packing** to be a separate factor. In our view it is a kind of a product that is why we present it within a factor **Product**.

17 Palatková (2006) considers **Politics** and **Public opinion** to be individual factors of the marketing mix. We consider them to be part of the processes through which a place may affect achieving established marketing objectives.

18 Some authors (Janečková, Vašítková 1999, Palatková 2006, Morrison 1995) consider **Partnership** to be a separate marketing mix factor. But as we understand it, its foundation is directly dependent on the factor – **People**. It could be viewed upon as a certain qualitative aspect of relationships between people who represent e.g. private companies, public organizations, various associations etc. In a practice, however, under special circumstances, it is not inevitably necessary for Mix.

Fig. 7: *The marketing mix of a place*

Source: (author)

1. We realize that determining and characterizing a place as a marketing *Product* is an extensive and complex issue that would deserve more space and attention. Here we focus only on a few selected attributes.

The strategy design is closely connected with *Packing* (packet creation). It is a kind of the product mix (or offering mix) commonly for a unified price. In Slovakia the creation of offer packets is becoming more and more popular. It is primarily connected with attracting investors' or tourists' attention. Packets are a specific kind of a product that is a result of the partial offers mix or subproducts. They create new marketing opportunities for addressing a wider market. Packets may also contain programming – a programme specification of packets. It demonstrates certain spreading out of a product (mainly in the area of tourism) in terms of interrelation and combination of a wide range of services oriented at clients' needs by means of specialized activities, programs, or events. Special activities may take place independently without being included in the packet (Palatková 2006, p. 134). Here it is necessary to remark that implication to mass occurrence may become a problem. Under the pressure of increasing competition places (similarly to commercial companies) are forced to the individualization of packets. It is not exceptional nowadays even in Slovakia that the effort of places directed at getting a particular investor leads to pre-negotiations. It results in the interactive creation of a packet which is tailored to a concrete potential client with limits of a place being respected. Tourist packets may well serve as a way of 'teaching' tourists how to utilize certain services (usually offered as some "extra services"). Mostly these are the services which the places have not succeeded in their introducing for a longer time or the services which may be used as an effective means in out-of-season periods. If this is the case then partnerships of different participating subjects are inevitable.

2. **Price** can be defined as a sum of financial means necessary for getting a product. It represents a value attribute of individual components of a product in marketing of a place by which the individual attributes of a place are assessed. It reflects the quality of the products on offer and the conditions of a place (Bernátová, Vaňová 2000, p. 34). The marketing approach in the price creation process requires that customer's opinions and views be taken into account. In this sense the creation of price is a tool of marketing communications with a customer. According to Foret (2006, p. 192-193) it should reflect: needfulness or usefulness of a product, product value (quality, services, brand, etc), product availability, financial capability of a customer, pricing strategy of competitors, own marketing strategy, and macro-social importance of a product. Some prices cannot be directly affected by a place. A place, however, possesses a number of possibilities and tools for its indirect regulation.

3. **Place** expresses the environment where a product is distributed; it signals certain quality level of a product to a client. Here we mean first of all a tangible environment that is characterized by a complex of attributes of a natural and anthropogenic character of a place. We mean its *physical evidence*¹⁹ and its localization within a wider context (availability, infrastructure level, character of natural environment, etc.). Its global appearance is adapted to the character of a marketing product that is being built by a place. When generating its physical elements it is vital to take into account its potential effect on the future place assessment from the viewpoint of its intangible attributes such as the atmosphere of the place and the complex of feelings the place evokes in customers, i.e. the image of a place.

4. Even an extraordinarily well prepared offering does not guarantee that the target customer will be addressed, that the customer will get the full message and understand it. Therefore it is important that places provide clear and comprehensible information on essential attributes and benefits of their offerings. This process of continuous marketing communications is conceived as a core of the whole marketing. However, there is also a view that marketing communications in its broader sense expresses all marketing activities. In the opposite, extreme view its meaning is restricted only to **Promotion**, mostly in the form of advertising with its persuasive accent (Foret 2006, p. 216-220). It has possibly resulted from the wrong translation of the word *promotion* into Slovak.

Successful marketing communication lies in stimulating and retaining the public's permanent interest and attention. According to Foret (2006, p. 220) the key task of the process is to find answers to the following eight questions: 1. *who is the message directed at?*; 2. *what do we want to announce?*; 3. *what impression do we want to make?*; 4. *how much money do we intend to spend on the whole event?*; 5. *through what channels do we want to deliver the message?*; 6. *what reactions do we expect from the recipient?*; 7. *how will we control and supervise the whole event?*; and 8. *how do we find out what we have achieved?*

These are the following most frequently used tool constituents of the communications mix: *public relations (PR)* (communications with the public) *advertising*, *sales promotion* and *personal communications*. The function of public relations is to build, establish and develop positive attitude towards the public (Foret 2006, p. 228, 275-293). The advantage

19 Smith (2000) introduces *Physical evidence* as an individual constituent of the mix. In the case of marketing of a place it may be understood as a set of properties determining the environment.

of the tool is its ability to reach a large audience at relatively low costs (Bernátová, Vaňová 2000, p. 36).

Advertising is any paid²⁰, extensive, non-personal presentation of a product or service on offer in mass media in order to inform, persuade and remind. Its form and frequency has to be subjected to the objectives. With regard to frequency three categories of advertising are distinguished: continuous advertising, e.g. regular - placed in equal periods during a year, pulsing advertising with different placing length (increasing or decreasing tendency) and finally, impact advertising that is placed in shorter scattered periods but with high intensity (Foret 2006, p.237-254).

Sales promotion uses short-term but effective stimuli directed at activating and speeding up sales and consumption. In the case of a place this tool is not frequently utilized as its application relates mainly to commercial activities of a place connected with sale. In our view it can find application in short-term travelling in motivating tourists to visit a place, for instance by the following slogan: "*We provide free parking on every third visit of our centre!*".

Personal selling is based on a direct contact with one or several potential clients (for instance an investor, citizens). Its advantage is undoubtedly more effective communication between partners, immediateness of the contact enabling an instant feedback. Its disadvantage is a limited radius of action in comparison with advertising (Foret 2006, p. 269-273).

5. Human agent *People* is considered to be a fundamental marketing element. *No other thing can replace intelligence, innovative human abilities and their aptitude to be assertive* (Mallya 2007). On the other hand a grandest plan may come to nought because of people. It is therefore important that this factor of marketing mix lead to harmony in the goal-fulfilling process. In relation to product and place we can divide them into three groups: staff, customers and partners.

With regard to the extent and frequency of contact with customers we distinguish the following staff groups:

- *contact staff* who have frequent contacts with customers and who have to be well-trained and motivated to solve problems,
- *modifiers* do not take part directly in marketing activities but from time to time they communicate with customers (receptionists, information desk staff, secretaries, etc.) and
- *influencers* similarly to modifiers' occasionally communicate with customers but they take an active part in production of marketing strategy of a municipal unit; they are mainly municipal authorities who negotiate with a potential investor, etc.

The staff also holds the isolated staff such as administration staff, computer specialists (e.g. network managers), maintenance workers, etc. who have a supporting role. The relations between them (primarily between top managers and "backstage staff") have a critical impact on the quality of the services provided (Janečková, Vašítková 1999, p. 104-106).

Customers of a place are not only users of services but also their promoters and information disseminators. Accordingly, working on a product concept a place should take

20 *Recently more and more new methods aimed at decreasing advertising and commercial costs at the minimum or at free products promotion. As an example guerrilla marketing or buzzmarketing can serve (Hughes 2006).*

into consideration users' behavior as well as all the motivations and preferences which affect their behavior. A set of needs of the targeted customers should be transformed into a set of general properties. It is fundamental to remember that to certain extent every customer participates in the communications process by disseminating information. Customers are verbal walking advertisers who deliver their experience with a product to other potential clients (Janečková, Vašítková 1999, p. 107-108).

The third group of people in the marketing process is the group of partners. „Partnerships” or in the conditions of self-governing territories „Public-Private Partnerships” reflect a certain level of quality of the relations between the public and private sectors. In a broader sense of the word partnerships may be understood as relations within the public or commercial spheres of a place. (The issue is discussed in detail in Ištván 2006; Rumpel 2002; Bernátová, Vaňová 2000; Janečková, Vašítková 1999, Pauličková 2005; Rainisto 2003; Florek 2006; Rumpel 2006; Szromnik 2006; Palatková 2006.)

6. A distribution *process* means the designing of an exact procedure of product providing. Customers perceive not only a particular product but also the way the product is offered to them. Janečková a Vašítková (1999, p. 111-2) classify the processes according to the intensity of contact with a customer into: services with high, low, and middle contact also including mediate contacts.

The processes of distribution of a place as well as of individual subjects of a place and their surroundings (we mean all private companies and firms, public organizations or concrete citizens, etc.) are affected by political decisions. „Politics” is one of the most important factors having a strong impact on place functioning. We think that nowadays it applies all over the world. It often happens that the achieving of particular goals is dependent on “political will”. That is the reason why a plan of different lobbying activities often becomes part of the marketing mix. Lobbying can be conducted at two levels: internal and external. The internal level (conditioned at least by the existence of self-governance of a place) represents politics inside a place, i.e. affecting concrete decisions of the municipal authorities, etc. The external level includes affecting political decisions outside a place, for example through lobbying regional authorities, the National Council or the European Parliament.

Politics is closely connected with the “Public option”. Public option is one of the most effective tools used for influencing the political direction as well as the targeting of marketing activities. The relation a place – the public opinion has a bidirectional implication. It provides a place with space for its formation and development through a wide range of marketing communications tools and urges a place to continuously verify the correctness and justness of marketing orientation. However, at the same time it gives potential clients (or competitors) space for the formation of the public opinion, for example for affecting the general attitude of the citizens to mining restoration or localization of heavy industry, etc. In fact, it is a process of creation of place image (already discussed in the part 1 b).

d) budget and alternative strategies

The result of the concept stage of the marketing process is an ideal set of partial goals and strategies which have to be transformed into their final forms. It often happens that a place cannot use them in the form that appears to be the best one. The limiting factor is

the budget. It is possible that after designing the budget a place has to create alternative strategies, i.e. “cheaper versions of the ideal”. After being optimised, it is necessary to work out an inspection schedule.

e) designing a marketing plan

Based on the documents and conclusions of the previous parts of the marketing process, after working out an inspection flow chart and designing the budget we may start to devise a marketing plan. Understandably, its character will depend on the character (first of all on the degree of heterogeneity) and the range of marketing goals. The marketing plan design requires to be created as a document consisting of partial plans for individual target areas. The main parts that a marketing plan should contain are presented in Table 1.

Tab. 1: *Structure of a marketing plan of a place*

INTRODUCTION	- PURPOSE AND BRIEF CONCLUSION OF MAIN OBJECTIVES OF A MARKETING PLAN - MARKETING PLAN CONTENTS
CURRENT MARKETING SITUATION	- PROFILE OF A PLACE - SITUATIONAL ANALYSIS
SWOT ANALYSIS	- WEAK AND STRONG POINTS OF A PLACE, OPPORTUNITIES AND POTENTIAL THREATS - MARKET SEGMENTATION
AIMS AND TASKS	- DETERMINING MAIN GOALS, TARGETING - DEFINING MAIN TASKS
MARKET STRATEGIES	- DESIGNING THE MARKETING PHILOSOPHY, POSITIONING - PARTIAL STRATEGIES, MARKETING MIX
IMPLEMENTATION PLAN	- THE WAY OF PLAN IMPLEMENTATION - DEAD-LINES AND APPOINTING RESPONSIBLE PERSONS
BUDGET	- PROJECTION OF PROFITS AND LOSSES - EXPECTED EARNINGS AND EXPENDITURES
INSPECTION SCHEDULE	- MONITORING PROCEDURE AND EVALUATION OF IMPLEMENTATION - PRECISE DEFINING OF INSPECTION ACTIVITIES - ELABORATING INSPECTION ACTIVITIES DETERMINING A WAY OF ASSESSMENT, SELECTION OF MILESTONES - DETERMINING A WAY OF REACTION TO UNPREDICTABLE CIRCUMSTANCES
CONCLUSION	- APENDIXES, SUPPLEMENTARY - APPROVAL AND ENGAGEMENT OF THE PEOPLE INVOLVED

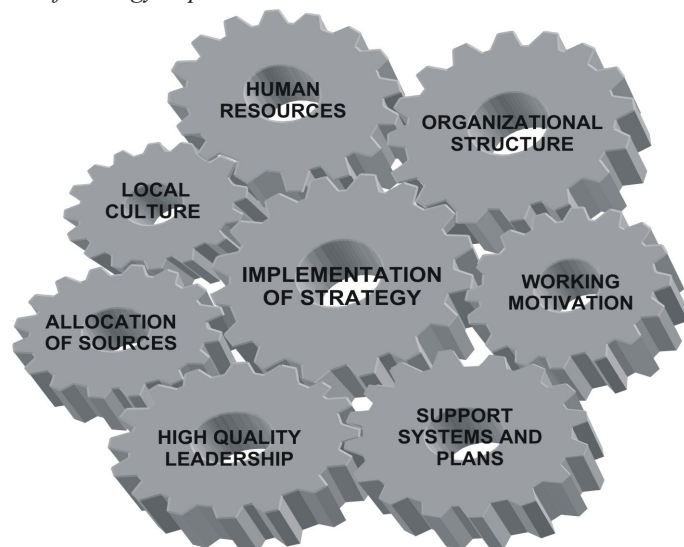
Source: (modified according to Kotler; Armstrong 2004, p.109-110)

IMPLEMENTATION CONTROL AND INSPECTION OF MARKETING STRATEGY

We often do not realize the distinction between the following two expressions: ‘implementation of a plan’ and ‘a plan of implementation’. Many times people’s dislike of change as well as their negative attitude towards marketing projects are observed in practice. Designing an implementation plan does not guarantee its performance and success. In order to achieve success it is necessary to identify with the plan. We agree with Mallya (2007) who claims that marketing strategy performance necessitates a far greater deal of energy and time than its conceptualization. While its conceptualization requires ‘creative chaos’ but its performance has a need of discipline and ability to plan, stimulate and supervise.

Successful implementation calls for an interplay of several elements constituting a complex mechanism in which stopping, impeding or slowing down one of them may affect the operation of a whole process (Figure 8).

Fig. 8: *Process of strategy implementation*



Source: (modified according to Mallya 2007, p. 137; Kotler, Armstrong 2004, p. 113)

“Panta rhei” or *“everything flows”*, nothing stands still or as Mallya (2007) claims *“we have to remember that the only certain thing is that there is no certainty”*. It continuously makes us observe, analyze, and reevaluate marketing strategies or adapt our goals to the real needs and afterwards modify a marketing plan to the current trends and market needs. And so again and again we move in an endless spiral and thus step by step we repeatedly carry out a marketing process.

CONCLUSION

The present paper is an attempt to contribute to producing a theoretical basis for the marketing process of a place. The marketing process in its complex form incorporates a set of heterogeneous interrelated activities materialized into a marketing plan. The uniqueness and unrepeatability of the essence of individual places directly determine certain differentiations and many times do not enable precise chronology of the individual stages of the marketing process of a place.

Its division into the following stages:

- stage 0: motivation (initial motivation, a plan of a process),
- stage 1: analysis (situational analysis),
- stage 2: determination (goals defining and marketing strategy determining), and
- stage 3: implementation (realization, control, and auditing of the marketing strategy),

provides certain generalization of these procedures that have already been successfully used. Within these stages a number of partial activities take place. They penetrate, overlap, occur simultaneously, and individual places may select their order and combinations (as well as add or leave out some of them) in accordance with the current needs. The whole process may be denoted as reiterative, feedback-like, cyclic and practically endless. The contemporary place-marketing approach is built on understanding of general principles of place functioning that are applicable to the whole variety of its specific forms. It utilizes all available information about a place. In our circumstances it is a new - and if applied precisely and appropriately – then also an extremely effective tool for the development of different-sized places.

Acknowledgement: This paper was prepared with the contribution of the grant VEGA 1/3050/06 "Kvalita života – konceptuálny rámec geografickej interpretácie priestorovej štruktúry mesta."

References

- AAKER, D., A. (2003): Brand building. Budování obchodní značky. Computer Press, Brno, 312 p.
- ASHWORTH, G. J., VOOGD, H. (1990): Selling the City: Marketing Approaches in Public Sector Urban Planning. Belhaven Press, London
- BERNÁTOVÁ, M., VAŇOVÁ A. (2000): Marketing pre samosprávy I., Marketing území, príručka pre samosprávy, UMB Banská Bystrica, Ekonomická fakulta, Inštitút rozvoja miest, obcí a regiónov, British Know – How Fund.
- BLAŽKOVÁ, M. (2005): Jak využit internet v marketingu. Krok za krokem k vyšší konkurencieschopnosti. Grada Publishing, a.s. Praha, 156 p.
- BUČEK, J. (?): Komunálna ekonómia a komunálna politika, citované: 22.1.2006, dostupné na: <http://www.fns.uniba.sk/~khg/Bucek.htm>
- CLARK, G. (2002): Emerging Local Economic Development Lessons from Cities in the Developed World, and their applicability to Cities in Developing and Transitioning Countries. World Bank Urban Forum: Tools, Nuts, and Bolts. Washington DC, April 2002. <http://www.worldbank.org/html/fpd/urban/forum2002/docs/clark-paper.pdf>, 26.12.2006.
- CLEMENTE, M. N. (2004): Slovník marketingu. Computer Press, Brno, p.378.
- ČICHOVSKÝ, L. (2001): Marketing na rozhraní dvou tisíciletí. Nakladatelství RADIX s.r.o., Praha
- DZIEKOŃSKI, M., KOZIELSKI, R. (2006): Jak szybko napisać profesjonalny plan marketingowy, Wolters Kluwer Polska Sp. Y o.o., Warszawa, 303 p.
- ĎAĎO, J., PETROVIČOVÁ, J., KOSTKOVÁ, M. (2006): Marketing služieb. Ing. Miroslav Mračko, EPOS, Bratislava.
- FANDEL, P. (2006): Globálne miery efektívnosti. Global Efficiency Measures. Dostupné na : http://www.slpk.sk/dizertacie/agrarni_perspektivy/fandel.pdf; citované 4.2.2007
- FLOREK, M. (2006): Podstawy marketingu terytorialnego. Akademia Ekonomiczna w Poznaniu, Poznań.
- FUSSHÖLLER, M. , HONERT, S., KENDSCHEK, H. (1995): Stadtmarketing – Ein Leitfaden für die Praxis. DSSW Schriften Nr. 14, Bon, p. 50, in Rumpel, P. (2002).

- Teritoriální marketing jako koncept územního rozvoje. Spisy Přírodovědecké fakulty Ostravské univerzity, sv. č. 145/2002, Ostravská univerzita.
- FORET, M. STÁVKOVÁ J. (2003): Marketingový výskum. Jak poznávat své zákazníky. Grada Publishing a.s., Praha, 159 p..
- FORET, M. (2006): Marketingová komunikace. Computer Press, a.s., Brno, 443 p.
- HETTNER, A. (1932): Das länderkundliche Schema. Geographischer Anzeiger, 33, 1-6.
- HORVATH, M. (2006): Nation Branding – komplexný prístup k prezentácii Slovenska. Úvahy o špecifických znakoch Slovenska sa neraz skončili len pri Jánošíkovi, oštiepku, bryndzových haluškách a folklóre. Týždenník Trend, 30.6., Bratislava, pp. 86-87
- HUGHES, M. (2006): Buzzmarketing. Prijímajte lidi, aby o vás mluvíli. Management Press, Praha, 215 p.
- IŠTVÁN, M. (ED.) (2006): Public-private partnership a Slovensko. Municipalia Žilina, 198 p.
- JANEČKOVÁ, L., VAŠTIKOVÁ M. (1999): Marketing měst a obcí. Grada Publishing s.r.o., Praha
- KERMALLY, S. (2006): Největší představitelé marketingu, jejich hlavní myšlenky, názory a díla. Computer Press, a.s., Brno, 104 p.
- KOTLER, P., ASPLUND, C., REIN, I., HAIDER, D. (1999): Marketing Places Europe. Pearson Education Ltd, London, 388 p.
- KOTLER, P. (2001): Marketing management. 10. rozšířené vydání, Grada Publishing, Praha, 720 p.
- KOTLER, P., HAMLIN, M. A., REIN, I., HAIDER D. H. (2002): Marketing Asian Places. John Wiley & Sons (Asia), Singapore, 443 p.
- KOTLER, P., ARMSTRONG, G. (2004): Marketing. Grada Publishing, Praha, 855 p.
- KOTLER, P. (2004): Marketing podle Kotlera. Jak vytvářet a ovládnout nové trhy. Management Press, Praha, 258 p.
- KOTLER, P., KELLER, K. L. (2007): Marketing management. Grada Publishing, 12. vydanie, Praha 2007, 788 p.
- KOUDELKA, J. (2005): Segmentujeme spotřební trhy. Kamil Mařík - Profesional publishing, 145 p.
- LEWIS, M. (1991): Understanding Brands, Kogan Page, D. Cowley (ed), London in Smith P., (2000). Moderní marketing, Computer Press, Praha
- MALLYA, T. (2007): Základy strategického riadenia a rozhodovania. Grada Publishing, a.s., Praha, 246 p.
- MATLOVIČ, R., MATLOVIČOVÁ, K. (2006): Koncept miesta vo vývoji geografického myslenia. In Kraft, S., Mičková, K., Rypl, J., Švec, P., Vančura M.(eds.): Česká geografie v Evropském prostoru, sborník příspěvku XXI. sjezdu České geografické společnosti, 30.8.-2.9.2006, Jihočeská univerzita v Českých Budějovicích, červen 2007, náklad 350 ks, ISBN 978-80-7040-986-2, 181-190 pp.
- MISIURA, S. (2006): Heritage marketing. Butterworth-Heinemann, an imprint of Elsevier Ltd. Oxford, 280 p.
- MORRISON, A. M. (1995): Marketing pohostinství a cestovního ruchu. Victoria Publishing, Praha in Platková, M. (2006). Marketingová strategie destinace cestovního ruchu. Jak získat více příjmů z cestovního ruchu. Grada, Praha, 341p.

- PLATKOVÁ, M. (2006): Marketingová stratégia destinácie cestovného ruchu. Jak získať viac príjmov z cestovného ruchu. Grada, Praha, 341p.
- PAULÍČKOVÁ, R. (2005): Regionálny a mestský marketing. Eurounion s.r.o., Bratislava
- RAINISTO, S. K. (2003): Success Factor of Place Marketing: A Study of Place Marketing Practices in Northern Europe And the United States, Espoo 2003.
- RUMPEL, P. (2002): Teritoriálny marketing jako koncept územního rozvoje. Spisy Přírodovědecké fakulty Ostravské univerzity, sv. č. 145/2002, Ostravská univerzita.
- RUMPEL, P. (ED.) (2006): Inovativní koncepty v socioekonomickém rozvoji územních jednotek. Sborník příspěvků z mezinárodního pracovního semináře. Ostrava. Inovace, inovativní koncepty a přístupy v územním rozvoji. Úvod do diskuse., 7-23 pp.
- SEATON, A. V., BENNETT M. M. (1996): The Marketing of Tourism Products: Concepts, Issues and Cases. International Thomson Business Press, London.
- SMITH, P. (2000): Moderní marketing. Computer Press, Praha, 518 p.
- SUN-C', SUN PIN (2005): Umění války. Helion s.a., Gliwice, Polsko, p. 296
- SZROMNIK, A. (2006): Marketing terytorialny – koncepcia ogólny i doświadczenia praktyczne. In Markowski, T. ed., Marketing terytorialny. Studia, Tom CXVI., Komitet Przestrzennego Zagospodarowania Kraju PAN, Warszawa, pp. 33-88.
- ŠTEFKO, R. (2003): Akademické marketingové inštrumentárium v marketingu vysokej školy. R.S. Royal Service Bratislava, 262 p.
- ŠTEFKO, R. (ED.) (2003): Dimenzie a faktory regionálneho rozvoja. Acta Facultatis Philosophicae Universitatis Prešoviensis. Prešov, 217 p.
- TRUEMAN, M. M., KLEMM, M., GIROUD, A., LINDLEY, T. (2001): Bradford in the Premier League? A Multidisciplinary approach to branding and repositioning a city. Paper submitted to European Journal of Marketing. Working Paper No 01/04 Bradford University School of Management, Bradford, in Seppo K. Rainisto, Success Factor of Place Marketing: A Study of Place Marketing Practices in Northern Europe And the United States, Espoo 2003.

PROCES MARKETINGU MIESTA – TEORETICKÉ ASPEKTY REALIZÁCIE

Zhrnutie

Predkladaná práca je príspevkom ku koncipovaniu teoretickej bázy procesu marketingu miesta. Marketingový proces, v jeho komplexnej podobe, inkorporuje komplex heterogénnych na seba nadväzujúcich činností, zhmotnených v podobe marketingového plánu. Jedinečnosť a neopakovateľnosť podstaty konkrétnych miest, priamo determinuje isté diferenciácie a mnohokrát neumožňuje ani presnú chronológiu jednotlivých fáz procesu marketingu miesta. Istou generalizáciou doposiaľ úspešne aplikovaných postupov by mohlo byť jeho rozdelenie do nasledujúcich fáz:

0. motivácia (vstupná motivácia, plán procesu),
1. analýza (situačná analýza),
2. koncepcia (koncipovanie cieľov a stanovenie marketingovej stratégie) a
3. implementácia (realizácia, riadenie a kontrola marketingovej stratégie).

V rámci týchto etáp prebieha celý rad parciálnych činností, ktoré sa prelínajú, prebiehajú simultánne a jednotlivé miesta ich môžu vykonávať v rôznom poradí a podľa potreby doplniť o ďalšie, či niektoré vynechať. Celý proces však možno označiť za reiteratívny, spätnoväzbový, cyklický a prakticky nekončiaci. Predmetný článok postupne charakterizuje zmienené fázy ako aj jednotlivé parciálne procesy v nich obsiahnuté.

Recenzovali: Prof. RNDr. Robert Ištók, PhD.

Doc. RNDr. Zdeněk Szczyrba, PhD.

LANDSCAPE DIVERSITY EVALUATION ACCORDING TO LAND COVER CLASSES IN THE NORTHERN HINTERLAND OF THE ZEMPLÍNSKA ŠÍRAVA WATER RESERVOIR

Eva MICHAELI¹, Jaroslav HOFIERKA², Monika IVANOVÁ³

Abstract: *The observed territory delimited by the cadastral territories of the villages of Vinne, Kaluža, Klokočov, Kúsin and Jovsa. It is located at the northern bank of Zemplínska širava water reservoir. Until 1960s when the construction of water reservoir was finished the geographic situation of the territory was different. The southern part of region was spread in the partial Širava rift valley. Till the end of Riss there was a relative tectonic inactivity in this structure. The process of subsidence in Würm and in the post-glacial period evoked the origin of marshy environment in depression. Considering the aspect of the landscape structure it was not appropriate to use it in agrarian system and even it was unhealthy. Based on the evaluation of the potential of the studied locality in melioration of the East-Slovakian lowland it was decided to integrate it into the system of retention water reservoir. It means, that the factor of the physico-geographic position of the studied territory that is located at the border of two contrast morphostructures with a different tectonic activity (the Vihorlat mountains and East Slovakian lowland) caused (in relation to agricultural activity of man) in the studied region a significant change in the landscape structure, land cover and thus also in its biodiversity.*

Key words: *paradynamic region, landscape diversity, land cover, nature landscape, Shannon index*

INTRODUCTION

The aim of the contribution is to study the changes of landscape diversity in northern hinterland of the Zemplínska širava dam in 1956 – 2005. The selection of area was influenced by its geographic location on the edge of two contrast units. The location in the largest scale has affected the transformation of land structure and the diversity of land cover. Factors that have conditioned the above changes might be divided into several groups. Since 1956 to 1960 the agrarian-economic factors occurred, later on there were institutional-organisation and social factors. After 1960 the factor of agrarian national politics became relevant, which was related to self-sufficiency corn production, and also the factor of development of water area recreation. In the last decade the region has

1 **Prof. RNDr. Eva Michaeli, PhD.,**

Department of Geography and Regional Development FHPV PU, St. 17. novembra 1, 081 16 Prešov, tel: 051/757 06 90, michaeli@unipo.sk

2 **Doc. Mgr. Jaroslav Hofierka, PhD.,**

Department of Geography and Regional Development FHPV PU, St. 17. novembra 1, 081 16 Prešov, tel: 051/757 06 90, hofierka@geomodel.sk

3 **RNDr. Monika Ivanová, PhD.,**

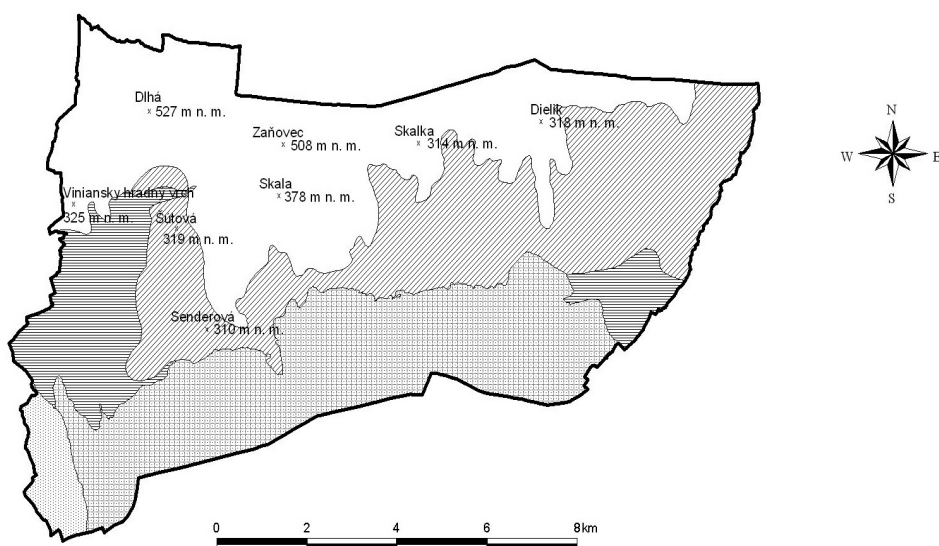
Department of Geography and Regional Development FHPV PU, St. 17. novembra 1, 081 16 Prešov, tel: 051/757 06 90, v8skrabu@unipo.sk

been affected by environmental factors which evoke new serious changes in landscape biodiversity.

GEOGRAPHIC POSITION OF THE REGION

The observed territory is located on the northern bank of Zemplínska šírava water reservoir, on the border of two genetically different contrasting units: the neovolcanic Vihorlat mountains that are built mainly by Neogene effusive formation and the East Slovakian lowland built by the loose clastic sediments of Miocene with cover of eolic and polygenetic sediments. It is located in the most tectonically active zone, that dropped approx. 500m during the period between the Early Badenian and Early Pliocene. The tectonic activity in this region was decreasing until the end of Sarmatian period, but the slowly processes of the subsidence were continuing to Pliocene and Quaternary period. The Quaternary neotectonic drifts present mainly new phase, independent by its extent and character; its beginning is dated beginning to the period of old Pleistocene. They caused the origin of the marked tectonic depression the Sub-Vihorlat rift valley. The part of this rift valley is the Šírava rift valley. Till the end of the Riss there was a relative tectonic inactivity in this structure. The intensive drifts reactivated the depression at the beginning of the Würm and in the postglacial. Its subsidential character was manifested by the swampy environment where moors were created. The clay fluvial and slope sediments were accumulated there. The total decrease of the Šírava rift valley was 10 – 15 m in that period (Baňacký 1987). The current tectonic subsidence of the territory is 1 – 0,5 mm per year. The geographic position of the observed territory considering the aspect of the above mentioned morphostructures is very important. It greatly influenced future development of its landscape structure that is a subject of the research described in this paper.

Fig. 1: *Geoecological landscape types*



1 INTERMOUNTAINOUS REGION

1.1 Plain accumulation region with porous groundwater

1.1.1 Fluvial plains with hydromorphic soils and humid vegetation



1.1.1.1 Aluvial cones and fluvial plains with the cover of Gleyic Stagnosols and Gleyic Fluvisols with primary vegetation of Carici elongatae - Alnetum typicum and Carici pilosae - Carpinetum



1.1.1.2 Flat marshy depressions with Haplic Gleysols with primary vegetation of Carici elongatae - Alnetum typicum

1.2 Hilly accumulation - erosive region with capillary groundwater

1.2.1 Accumulation - erosive to denudated hills with primary vegetation of the thermophilic forests



1.2.1.1 Polygenetic uplands with Gleyic Stagnosols with primary vegetation of thermophilic Quercetum

1.2.2 Loess - accumulation hills with primary vegetation of thermophilic forests



1.2.2.1 Loess uplands with cover of Gleyic Stagnosols and Andic Cambisols with primary vegetation of Carici pilosae - Carpinetum

2 MOUNTAINOUS REGION

2.1 Mountainous erosive -denudation region with rift groundwater

2.1.1 Temperately warm uplands mountains with forests vegetation Carici pilosae Carpinetum and Fagetum



2.1.1.1 Highlands on the silicate substrate with Distric Cambisols and Andic Cambisols with Carici pilosae - Carpinetum and acidophilic Fagetum

Source: (Mazúr et al. 1980 and own terrain research)

Considering other factors in this territory, the key role have climatic and hydrologic conditions. Speaking about climate the main southern part of the territory belongs to a warm climate region, area T7, that is warm, moderately humid with cold winter with the average temperature in January -3°C and lower temperature. The northern part of the territory belongs to the moderately climate region, area M3, that is moderately warm, moderately humid. The average July temperature is $\geq 16^{\circ}\text{C}$ (Lapin, et. al. 2002, map No. 27 Climatic regions). Hydrologically it belongs to the Laborec basin. The soil cover is presented by cambisols and luvisols with the epiphenomenon types of intrazonal soils. The primary plant communities were mostly removed and a landscape was transformed to the cultural steppe. Later in the sixties, after Zemplínska šírava construction, the dominant agricultural function, typical for the central and southern part of the region, is declining in favour to the recreational function.

METHODOLOGY

In the frame of current geographic research we consider studying the relations between nature and society as well as the quantification of those relations to be a cardinal trend. The observed territory, as it is evident from the above mentioned aspect of the geographical position, has a character of the paradyamic system with two contrasting units, the Vihorlat mountains and East Slovakian lowland bounded together by the flow of mass and energy.

The primary paradyamic system of the Vihorlat mountains and adjacent part of the East Slovakian lowland evoked by its geoecological structure in a connection with a

dominant agricultural function of the whole East Slovakian lowland, whose quality was lowered by the vast inundations that appeared on approximately 60 000 ha of agricultural land. The decreasing swampy Šírava rift valley between Vinné and Jovsa had good presumptions for construction a retention water reservoir that was a significant and very important element in the melioration system of the East Slovakian lowland. Landscape in the northern hinterland of Zemplínska šírava water reservoir is a result of a mutual long - lasting activity of natural factors, conditions and processes, as well as the economy exploitation by a man. Evident changes in its structure have been recorded in last 45 years. The aim of this paper is to analyze and evaluate those changes during the period of 1956 - 2005.

The analysis and evaluation of the changes of the studied territory was based on the particular methodological procedures. In the preparation pre-research phase we accepted the hypothesis about the original status of the landscape that functions without the involvement of a man – ergo reconstructed landscape before human activities. According to Ložek (1973) at our territory the existence of such landscape can be limited by the period of Epiatlantic (from -3000 to -3500 years), when a more continuous farmer settlement appeared (primeval ecumena). A reconstruction of the natural landscape lies in an analysis of its physicogeographic elements and components, relations and characteristics that are conditioned by a dynamic homeostasis of the landscape. The relevant method for the knowing of the spatial natural landscape is the complex taxonomical physicogeographic synthesis on the level of the topic units that were mapping in the terrain. This method is very laborious, but correct. The spatial taxonomical synthesis can be achieved by the overlaying the map layers of the physicogeographic analytical maps with the same measure.

In this article the natural landscape was studied according to regional typology of the Slovak territory proposed by Mazúr et. al. in the Atlas of SSR (1980) by the map of Geoecological Natural Landscape Types, that were used as a basis for evaluation of the studied territory in relation to its usage. This map was modified at the base of a detailed analytic terrain research, other literature sources and cartographic materials. The terrain research stem from geological maps in scale 1: 50 000 (Baňacký 1988) and from the geomorphologic mapping. The identified soil types were based on the current morphogenetic classification system (Šály et. al. 2000) and soil maps produced by VUPOP (Soil Science and Conservation Research Institute, Bratislava). These maps were verified by field mapping. A potential natural vegetation of the territory was elaborated based on a Geobotanic map of Slovakia (Michalko 1986a,b) and according to the author maps of Botany Institute SAV (Slovak Academy of Science, Bratislava). To evaluate a current structure of the landscape, modified Slovakian Corine Land Cover database in our paper was also used (O'ahel' et al. 2004), that is a component part of the European Corine Land Cover database (CLC) created at the beginning of 1980s.

The identification of land cover changes is an appropriate means for assessing the dynamism of natural processes and social influences, as well as the possibilities of landscape development. We understand the changes in land cover as a succession of various statuses of the landscape at particular time periods (Feranec et al. 1997) and it is represented by the data layers of land cover.

The term diversity is mostly used in biological and ecological sciences and is associated with evaluation of the quality of environment and stability of plant and animal associations. In a broader sense the diversity is evaluated also in ecological stability of landscape (ÚSES – territorial system of ecological stability) and permanent sustainability. The terms biodiversity and landscape diversity in geographical sense associated especially with the need of landscape and territorial planning of the ecologically balanced function-spatial landscape structure are very often used in the works of these authors: Mimra (1995), O’ahel’, et. al. (2004), Bugár, Petrovič, Boltžiar, Vereš, Hreško (2006), Boltžiar (2007). The landscape diversity as the important characteristics is significant especially from the aspect of its use, organization and managing the landscape, but also from the aspect of landscape planning and environment protection. The current landscape status is a result of human influence on the natural landscape. The landscape diversity was analyzed in the context of known relations of both structures at various time periods. To evaluate the landscape diversity the land covers from the various time periods were used. The diversity was expressed as a number of areas of land covers in different classes of a natural landscape. As this method did not consider the area of the natural landscape types we also introduced the calculation per 1 ha of the area of a particular type of natural landscape. The more apposite values were received using the environment GRASS, where using the command *r.le.pixel* (Baker, Cai, 1992) we calculated the values of landscape diversity for moving windows with the real size 450*450 m with 15 m raster definition. The above mentioned command was also applied in calculating landscape diversity for the types of natural landscape that is understood as regions.

LANDSCAPE DIVERSITY ASSESSMENT

One of the basic indices used in a landscape diversity research (level of fragmentation) is a **number of land-covers classes in different types of natural landscape**. But, as the classes of the land-cover reflect different level of social usage and its potential development, we divided them (in accordance with the modified CORINE Land Cover legend, O’ahel’ et al. 2004) into three groups: 1xx (urban areas and industrial areas), 2xx (agricultural areas) and 3xx - 5xx (forest and semi-natural areas, marshes and water bodies).

Tab. 1: *Landscape diversity according to the number of polygons of the selected classes of the land cover (CLC) in the individual types of natural landscape*

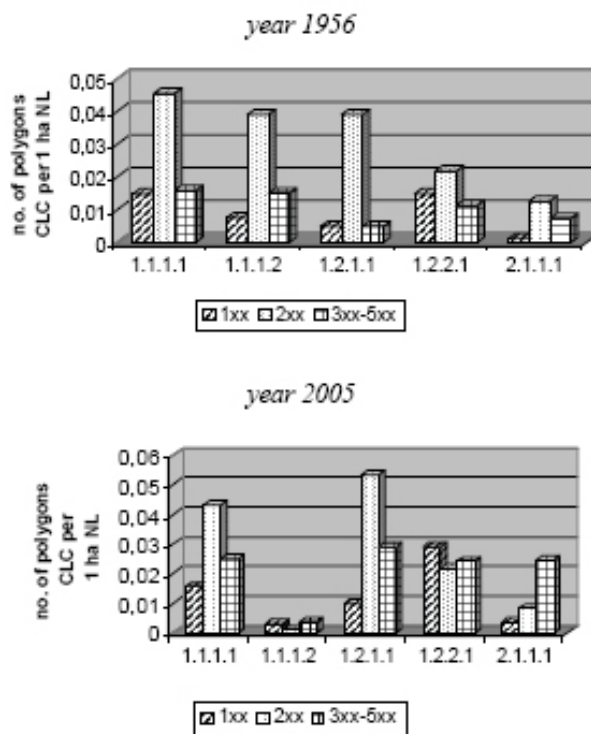
Classes of natural landscape	CLC 1956				CLC 2005				Change CLC 1956 –2005			
	1xx	2xx	3xx -5xx	Total	1xx	2xx	3xx -5xx	Total	1xx	2xx	3xx -5xx	Total
1.1.1.1	12	44	18	74	14	38	22	74	2	-6	4	0
1.1.1.2	15	78	30	123	6	2	7	15	-9	-76	-23	-108
1.2.1.1	1	8	1	10	2	11	6	19	1	3	5	9
1.2.2.1	34	50	26	110	67	50	56	173	33	0	30	63
2.1.1.1	3	33	19	55	10	22	64	96	7	-11	45	41
Total	65	213	94	372	99	123	155	377	34	-90	61	5

1.1.1.1 Alluvial cones and fluvial plains with the cover of Gleyic Stagnosols and Gleyic Fluvisols with primary vegetation of *Carici elongotae – Alnetum typicum* and *Carici pilosae-Carpinetum*

- 1.1.1.2 Flat marshy depressions with Haplic Gleysols with primary vegetation of Carici elongatae – Alnetum typicum
- 1.1.1.1 Polygenetic uplands with Gleyic Stagnosols with primary vegetation of thermophilic Quercetum
- 1.1.1.1 Loess uplands with cover of Gleyic Stagnosols and Andic Cambisols with primary vegetation of Carici pilosae-Carpinetum
- 1.1.1.1 Highlands on the silicate substrate with Distric Cambisols and Andic Cambisols with Carici pilosae-Carpinetum and acidophilic Fagetum

More detailed data about diversity can be found in graph 1 calculated as the share of number of polygons of the selected land cover classes per 1 ha of area of particular types of natural landscape. The range in 1956 varies from 0,0011 (urban and industrial areas within the type of natural landscape 2.1.1.1) to 0,0455 (agricultural areas within a type of nature landscape 1.1.1.1). In 2005 the values range varies from 0,001 (agricultural areas within a type of nature landscape 1.1.1.2) till 0,0536 (agricultural areas within a type of natural landscape 1.2.1.1).

Graph 1: Landscape diversity according to the number of polygons of the selected classes of the land cover per 1 ha of area of particular types of nature landscape



Source: (authors)

The spatial distribution of landscape diversity can be seen in the fig. 2 - 5. Their values were calculated by d_2 – **Shannon's Diversity Index H'** :

$$H' = \sum_{i=1}^m p_i * \ln(p_i),$$

where p_i is the share of the area of i -th polygon of the total area of analysed spatial unit represented by m polygons.

The first method (used in fig. 2 and 3, Shannon's Diversity Index H' calculated per types of nature landscape) was based on the analysis of two maps: natural landscape types and land cover. The resulting values of diversity were calculated in GRASS GIS using the `r.le.pixel` command that is part of the `r.le` set of programs developed by Baker and Cai (1992). The outcomes were the maps of the natural landscape types with a particular value of diversity. The highest diversity was calculated for year 1956 and identified in the type of natural landscape of the loess uplands (1.280); a bit smaller diversity was found in the type of polygenetic uplands (1.125). Middle high diversity (1.042) appeared on the flat marsh depressions, the lowest (0.603) on the alluvial cones and fluvial plains.

In 2005 almost doubled increase of the land cover classes appeared compared to 1956 and the highest values of diversity was identified in the type of natural landscape of the polygenetic uplands (1.555).

The increase of the land cover classes in case of the type of natural landscape of loess uplands was adequately reflected also in the index of their diversity (1.256). Conversely, a marked decrease in a number of areas of land cover classes was manifested in the natural landscape type of the flat dam depression and in a landscape type of the alluvial cones and fluvial plains.

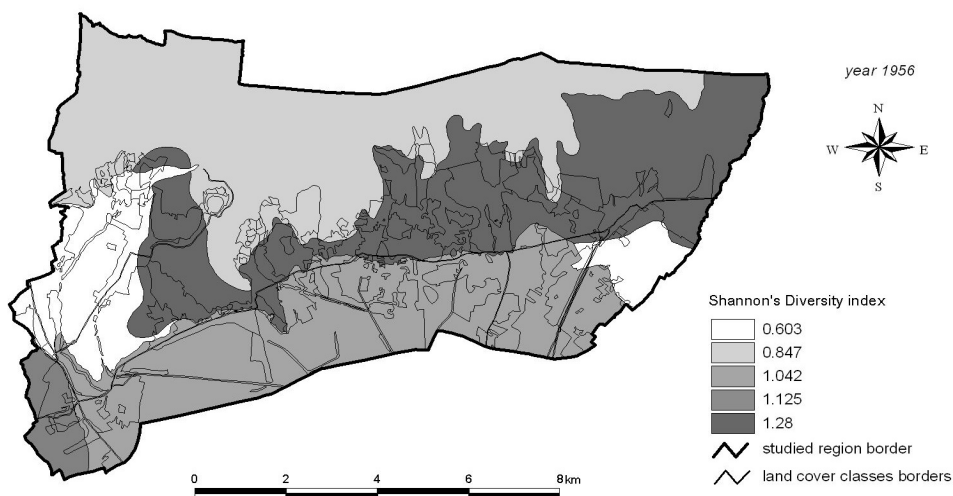
The more precise calculation of diversity provides the method of moving windows (fig. 4 and 5 calculated using Shannon's Diversity Index). The landscape diversity was calculated by `r.le.pixel` command (Baker, Cai, 1992) for moving windows of real size 450*450 m and 15 m raster resolution. The final value was added to the central pixel of moving window.

Contrary the previous method it is not limited to the space of particular nature landscape type but it enables also to quantify (depending on a number of moving windows) relatively high number of values in a space of whole studied region. The analysis of the spatial distribution of diversity shows that the highest values were reached in the year 2005 in the area of recreational center Biela hora (the White mountain), along the state communication No. 582 in Vinné – Jovsa direction, easterly from the built-up area with family houses and gardens of Klokočov village, westerly from the built-up area with family houses and gardens of Jovsa village and along the eastern bank of Zemplínska šírava water reservoir in cadastral territory of Jovsa village.

In 1956 the highest concentrations of diversity were associated with the areas of grasslands, vineyards and shrubs localized among the Viniansky castle and the northern part of the built-up area with family houses and gardens of Vinné village, as well as in the space of corridor area of a state road in direction Michalovce - Jovsa and Michalovce - Trnava nad Laborcom. The heterogeneity was also found in the space of grasslands and

vineyard northerly from the built-up area with family houses and gardens of Kaluža village. A high landscape diversity that was identified in the year 2005 in several parts of the studied area is a result of occurrence of higher number of smaller areas of land cover classes within a moving window. A good example is a space localized at the northeast – east from the built-up area with family houses and gardens of Klokočov village that was originally covered just with the areas of grasslands and arable land.

Fig. 2: Landscape diversity in the types of nature landscape (year 1956)



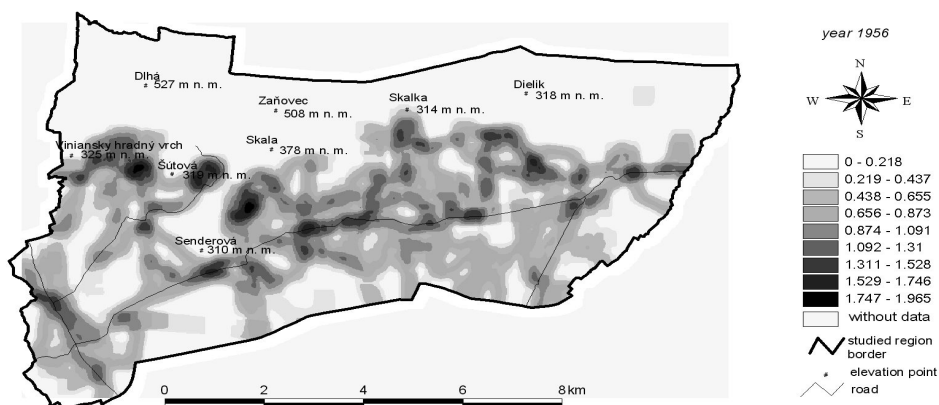
Source: (authors)

Fig. 3: Landscape diversity in the types of nature landscape (year 2005)



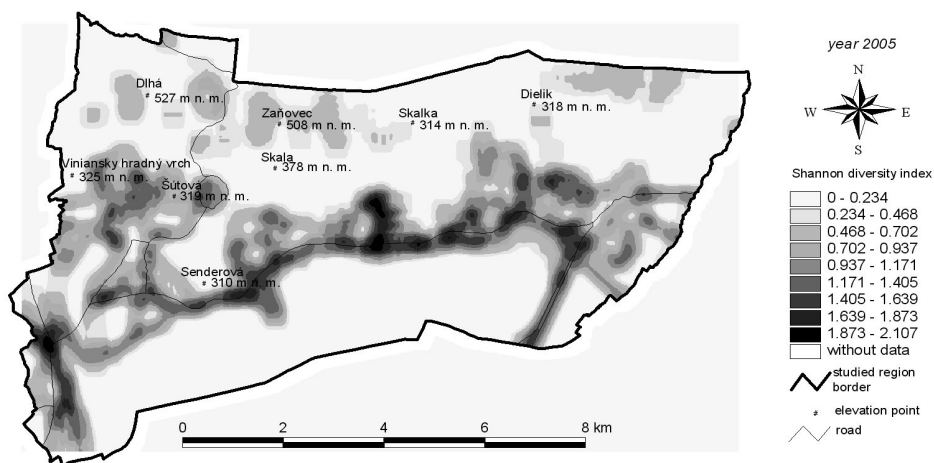
Source: (authors)

Fig. 4: Landscape diversity (real size of moving window 450*450 m, raster resolution 15 m, year 1956)



Source: (authors)

Fig. 5: Landscape diversity (real size of moving window 450*450 m, raster resolution 15 m, year 2005)



Source: (authors)

CONCLUSION

The most significant change in a landscape structure were influenced by the construction of Zemplínska šírava water reservoir that supported a major change (increase) in the diversity development mainly in its coastal zone. On the other side there was a significant decrease of diversity in the area of flat marshy depressions with primary vegetation of *Carici elongotae - Alnetum typicum* and swamp vegetation that was annexed by a water reservoir. The landscape diversity belongs to the basic characteristics of landscape. In the paper was calculated at the base of the land cover classes. It reflects the level of

exploitation of the landscape by a society. The knowledge about the landscape diversity is a source for determining the quality of environment, ecological stability of landscape and a basis for other environmental planning.

A structure of land cover, studied using various methods in GIS enabled us to compare the changes in landscape diversity in the hinterland of Zemplínska šírava water reservoir at various time horizons. In this context it shows at the causes of its increase, or decrease of the land cover classes in the various types of natural landscape. The research results are closely connected with a functional structure of the landscape and enable us to make a prognosis about future development of the studied territory.

Acknowledgement: This paper is part of the scientific project APVV No. COST-0016-06 Cultural landscape in Slovakia – regionalization, protection and planning and the scientific project VEGA No. 1/4028/07 Research and geoecological evaluation of changes in the use of cultural landscape in selected foothills region in Slovak republic.

References

- BAKER, W. L., CAI, Y. (1992): The r.le programs for multiscale analysis of landscape structure using the GRASS geographical information system. *Landscape ecology* 7, pp.291-302.
- BAŇACKÝ, V., et. al. (1987): Vysvetlivky ku geologickej mape severnej časti Východoslovenskej nížiny. Geologický ústav Dionýza Štúra, Bratislava, 117 s.
- BAŇACKÝ, V., et. al. (1988): Geologická mapa severnej časti Východoslovenskej nížiny. M: 1: 50 000. Geologický ústav Dionýza Štúra, Bratislava.
- BOLTIŽIAR, M. 2007. Hodnotenie vývoja heterogeneity a vybraných charakteristík plôšok krajinej štruktúry. In: *Acta Environmentalica Universitatis Comeniae*, Vol. 15, 2007, č. 2, s. 68-79.
- BUGÁR, G., PETROVIČ, F., BOLTIŽIAR, M., VEREŠ, J., HREŠKO, J. (2006): Interpretácia zmien druhotnej krajinej štruktúry vo vzťahu k biodiverzite. In: Hreško, J., Pucherová, Z., Baláž, I. a kol. *Krajina Nitry a jej okolia – úvodná etapa výskumu*. Nitra: Fakulta prírodných vied Univerzity Konštantína Filozofa v Nitre, 2006, s. 34-51. ISBN 80-8094-066-5.
- FERANEC, J., et. al. (1997): Analýza zmien krajiny aplikáciou diaľkového prieskumu Zeme. In: *Geographia Slovaca*, roč. 13, 1997, 64 s.
- FERANEC, J., OŤAHEL, J. (2001).: *Krajinná pokrývka Slovenska*. Bratislava: Veda, 2001, 122 s. ISBN 80-224-0663-5.
- HOFIERKA, J. (1993): Geometrická analýza povrchov (2D) a objemov (3D) ako nástroj pre skúmanie dynamických javov prírodnej krajiny v rámci 3D geoinformačných systémov. *Kartografické listy*, 1, pp.107-112.
- HOFIERKA, J. (2003): *Geografické informačné systémy a diaľkový prieskum Zeme*. Vysokoškolské učebné texty. Prešovská univerzita. Fakulta humanitných a prírodných vied. Prešov, 2003
- CHRASTINA, P. (2005): Kultúrna krajina Trenčianskej kotliny a okrajov priľahlých pohorí: vývoj využitia. In: *Tváň našej zeme – krajina domova : Dodatky*. Praha; Průhonice: Společnost pro krajinu; MŽP ČR, 2005, s. 101-109. ISBN 80-86512-35-5 .
- CHRASTINA, P. (2006): Vývoj využitia kultúrnej krajiny na SV okraji Bakošského

- lesa (obce Cáfár, Čerňa a Jášč). In: Kultúra, jazyk a história Slovákov v Maďarsku. Divičanová, A. - Ján-Tóth, A. - Uhrinová, A. eds. Békešská Čaba : VÚS, 2006, s. 344-357. ISBN 963-86573-8-3.
- CHRASTINA, P. (2006): Vývoj krajiny Trenčianskej kotliny a jej horskej obruby. In: Krajinná architektúra a proměny historických prostorů. Krejčířík, P. ed. Brno : ZF MZaLU, 2006, s. 120-129. ISBN 80-7157823-1.
- CHRASTINA, P., BOLTÍŽAR, M. (2006): Kultúrna krajina SV okraja Bakoňského lesa v Maďarsku (súčasnosť v kontexte minulosti). In: Historická geografie - Supplementum I. Šimůnek, R. ed. Praha : HÚ AV ČR, 2006, s. 175-188. ISBN 80-7286-093-3.
- IVANOVÁ, M. (2006): Hodnotenie kultúrno-spoločenského potenciálu vybraných obcí michalovského okresu. In: Folia Geographica, roč. 45, 2006, č. 10. s. 206 - 210. ISSN 1336 - 6157.
- IVANOVÁ, M. (2006): Zmeny v krajinej štruktúre podvihorlatských obcí Vinné, Kaluža, Klokočov, Kusín a Jovsa. In: Geografická revue, roč. 2, 2006, č. 2 s. 130 - 134. ISSN 1336-7072.
- LOŽEK, V. (1973): Příroda ve čtvrtohorách. Praha: Akadémia, 1973, 372 s.
- MAZÚR, et. al. (1980): Geoekologické (prírodné krajinné) typy. M: 1: 500 000, In: Atlas SSR, Bratislava: GÚ SAV, 1980, s. 98-99.
- MICHAELI, E., (2005): Transformácia využívania kultúrnej krajiny na príklade katastrálneho územia Jakuban za ostatných 50 rokov. In: Folia Geographica 8, 2005, s. 108 – 115. ISSN 1336-6149.
- MICHAELI, E., IVANOVÁ, M. (2005): Regionálna geoekologická štruktúra krajiny a primárny rozvojový potenciál Prešovského samosprávneho kraja. In: Folia Geographica 8, 2005, s. 116 – 142. ISSN 1336-6149.
- MICHALKO, J., et. al. (1986a): Geobotanická mapa ČSSR 1:200 000 – mapová časť. Bratislava: Veda, 1986.
- MICHALKO, J., et. al. (1986b): Geobotanická mapa ČSSR – textová časť. Bratislava: Veda, 1986, 168 s.
- MIMRA, M. (1995): Hodnocení prostorové heterogenity krajiny z hlediska její biotické rozmanitosti. In: Geografický časopis, roč. 47, 1995, č. 2. s. 131-144. ISSN 0016-7193.
- OŤAHEL, J. et. al. (2002): Diverzita krajiny Slovenska. In: Geografický časopis, roč. 54, 2002, č. 2, s. 131-150.
- OŤAHEL, J. et. al. (2004): Krajinná štruktúra okresu Skalica: Hodnotenie zmien, diverzity a stability. In: Geographia Slovaca, roč. 19, 2004, 120 s.

HODNOTENIE DIVERZITY KRAJINY PODĽA TRIED KRAJINNEJ POKRÝVKY V SEVERNOM ZÁZEMÍ VODNEJ NÁDRŽE ZEMPLÍNSKA ŠÍRAVA

Zhrnutie

Najzávažnejšiu zmenu v diverzite krajiny- krajinej pokrývky, podmienila výstavba vodnej nádrže - Zemplínska šírava, ktorá na jednej strane síce podporila zmenu a zvýšenie - rozvoj diverzity vo svojom pobrežnom pásme, ale na druhej strane došlo k jej výraznému

zníženiu v priestore plytkých zamokrených depresí s pôvodnou vegetáciou lužných lesov a močiarovou vegetáciou, ktorý bol zabratý vodnou nádržou. Diverzita krajinej pokrývky patrí k základným vlastnostiam krajiny. Odráža mieru exploatácie krajiny spoločnosťou. Poznanie diverzity krajinnnej pokrývky je zdrojom pre určenie kvality životného prostredia, ekologickej stability krajiny a podkladom pre ďalšie environmentálne a plánovacie činnosti.

Štruktúra krajinej pokrývky – diverzita, skúmaná prostredníctvom rôznych metód v prostredí GIS, nám umožnila porovnať zmeny v diverzite krajiny v zázemí Zemplínskej šíravy v rôznych časových horizontoch a v tejto súvislosti odhaliť príčiny nárastu, resp. poklesu tried krajinej pokrývky v jednotlivých triedach prírodnej krajiny. Výsledky výskumu veľmi úzko súvisia s funkčnou štruktúrou krajiny a umožňujú prognózovať jej vývoj v predmetnom území.

Recenzovali: Prof. Ing. Jozef Vilček, PhD.
Doc. RNDr. Martin Boltížiar, PhD.

TRANSFORMATION OF PHYSICAL-GEOGRAPHIC STRUCTURE OF LANDSCAPE OF PARADYNAMIC SYSTEM OF NORTHERN HINTERLAND OF ZEMPLÍNSKA ŠÍRAVA WATER RESERVOIR

Eva MICHAELI¹, Jaroslav HOFIERKA², Monika IVANOVÁ³

Abstract: The paper analyses the landscape structure on the example of a paradynamic system (contrast region) in the hinterland of Zemplínska šírava reservoir delimited by the cadastral territories of the villages of Vinne, Kaluza, Klokocov, Kusin and Jovsa. For this purpose a set of aerial photographs and topographical maps were used. The changes of the landscape structure stem from the land use analysis assessed by the methods of GIS and mathematical statistics. Different economical, social and political development is visible also in the land use. In 1826 the studied area was a half-natural landscape with small society influence that started to increase after the collectivization development.

Key words: landscape structure, land use, natural landscape, cultural landscape, GIS, function changes

INTRODUCTION

Physical-geographical complex of landscape presents a complex of natural landscape that is being recreated by a man. Nowadays it cannot be told about a natural landscape per se and it cannot be reconstructed scientifically. It is of big importance in evaluating landscape as it presents the basis for revitalization.

Transformation of a natural landscape into a cultural one is thus necessary to be understood in time-spatial context. Time and space present to the most important universal quantities – dimensions, in which the natural and human forces mutually form and permanently create the natural landscape to the cultural one and imprint the unique character to it (Žigrai 2000).

The current development of GIS brings the progressive possibilities of mapping the landscape structure using Earth remote sensing methods. Using the aerial photographs from various periods of time enable us to trace the dynamism of the landscape development at the relatively large territories. It is also successfully applied in case of regional and local scales.

1 **Prof. RNDr. Eva Michaeli, PhD.,**

Department of Geography and Regional Development FHPV PU, St. 17. novembra 1, 081 16 Prešov, tel: 051/757 06 90, michaeli@unipo.sk

2 **Doc. Mgr. Jaroslav Hofierka, PhD.,**

Department of Geography and Regional Development FHPV PU, St. 17. novembra 1, 081 16 Prešov, tel: 051/757 06 90, hofierka@geomodel.sk

3 **RNDr. Monika Ivanová, PhD.,**

Department of Geography and Regional Development FHPV PU, St. 17. novembra 1, 081 16 Prešov, tel: 051/757 06 90, v8skrabu@unipo.sk

Analysis of the landscape structure that is evaluated by the method of multitemporal analysis can be found in the works of the following authors: (Feranec, Oťahel', 2001, Boltížiar 2003, 2005, Feranec, Oťahel', Cebecauer, 2004, Oťahel' et. al. 2004, Cebecauerová, Cebecauer 2005, Cebecauer, Hofierka 2007, Michaeli, Hofierka, Ivanová 2008a, 2008b, Ivanová 2006).

The aim of this article was to analyze and evaluate the changes in a physical-geographic structure of landscape and functional use of landscape of a paradyamic system of the northern hinterland of Zemplínska širava reservoir specified by the cadastral territories of the following villages of Vinné, Kaluža, Klokočov, Kusín and Jovsa. The identification of changes was realized by process of covering the layers in the GIS software Arc View. The results that we gained by layers covering were elaborated to the contingency tables and graphs of transformation of changes in land use. For the land use analyses the maps from the second military mapping in 1826 and military topographic maps from 1956 were used.

PHYSICAL-GEOGRAPHICAL CHARAKTERISTICS OF THE STUDIES REGION

The studied territory is situated on the northern bank of Zemlínska širava, on the border of two genetically different, contrastive units, namely: volcanic Vihorlat mountains built mainly by the Neogen effusive rock and Podvihorlatska upland built by the loose clastic sediments of Miocene with the thick cover of Aeolian and polygenetic Quaternary sediments. It is situated in a tectonically most active zone, on the border of the East Slovakian lowland and Podvihorladská upland, that that dropped approximately 500 m during the period between the upper Badenite and the upper Pliocene. The tectonic activity was decreasing until the Sarmat period. The tectonic disturbances were also manifested in Pliocene and partly they continued into Quaternary period. The Quaternary neotectonic shifts present mainly new, as to the area and character, independent phase with the beginning that can be set to the period of Early Pleistocene. It resulted in the creation of tectonic depression – the Sub-Vihorlat rift valley, the part of which the Širava rift valley is. Till the end of the Riss it was tectonically inactive. The intensive shifts started at the beginning of the Würm and in the Postglacial. Its subsidiary character was presented by the swampy environment, where the peat - soil arose. The earthy fluvial and slope sediments were piled up here. The total decrease of the Širava structure in that period was 10 – 15 m (Baňacký 1987). Currently, we have been recording 1 – 0,5 mm tectonic decrease of the territory yearly. The geographic position of the studied territory is very important considering the above mentioned morphostructures. It influenced its future development of its landscape structure to great extent and this is also a subject matter of our article. Considering other position factors – the climatic and hydrological conditions had also an important role. Considering the climate aspect, the territory belongs to the warm climate zone, area A₆, that is warm, moderately humid with cold winter with an average temperature in January –3° up to - 5° C. Hydrologically the territory belongs to the Laborec basin. The soil cover is presented by cambisols and luvisols with epiphenomenon types of intrazonal soils. The original plant-association were mostly eliminated and the landscape was changed to the cultural steppe, later in the sixties after Zemplínska širava was constructed, dominant agricultural function, in the central and southern part of our region it decreases in favor of recreational one.

METHODS

The methodology was focused on the evaluating of the information sources, topographic maps and aerial photographs from the different time periods. The landscape changes evaluation was realized using the method of layers covering in GIS Arc View 3.2 software in the years 1826 and 1956. The results that we gained by layers covering were elaborated to the contingency tables and graphs of changes in land use.

LAND USE CHANGES EVALUATION

Landscape structure underwent serious changes in 1826. From the point of use the studied period presented in 1826 half-natural landscape. The forests were covering more than 50% of a total territory, 23% was arable land (with a scattered lineary and solitary vegetations and without it) and 22% sustainable grasslands (wet meadows, sustainable grasslands with a scattered line and solitary vegetation and without it, table 1). From the sources available it is evident that this character with the gradual continual changes had been kept by the land of the studied area until the beginning of the 50ties of the 20th century.

The citizens were usually working at the manor houses, small handicrafts, skidding logs out of wood until the abolishment of subjection in 1849, they were not allowed to have their own soil. Land reforms that were run in the later period should have diminish the excessive disintegration, to enable citizens to get soil and thus at least partly to balance the differences between squires and small peasants. Unfortunately, their realization was rather difficult and big size of soil still stayed in the hands of small group of rich feudals.

There were rapid changes in the property shares in the fifties of the 20th century when the government was forcing the idea of collectivization what was also reflected in the changes of its use. The share of the arable land without scattered vegetation in the absolute values raised in more than 700 ha (8,9%, table 1), what was influenced by the transformation of the unused sustainable grasslands with scattered vegetation (fig. 1). An increasing effort to use land more effectively for agricultural purposes led towards the gradual diminishing of the scattered vegetation, namely from the arable land as well as from the sustainable grasslands (table 1, fig. 1). The evidence of the developing agricultural activity is the origin of three areas of agricultural cooperatives: JRD Vinné, JRD Klokočov and JRD Jovsa. From the second mapping military map from the year 1826 is evident that there was a relatively extensive (4,5 ha) sheepfold. It was located at the southwestern part of the cadastral territory of Vinné village. It disappeared until the year 1956 (table 1).

The most remarkable change in the studied period 1826 – 1956 can be considered the transformation of wet sustainable grasslands into their non-wet form (fig. 1). Overflowing of the river lines in spring storm water caused marshing the sustainable grasslands that were prevented by the by extensive land drain that were realized before the construction of Zemplínska šírava. Blatský potok with its tributaries Kamenný jarok and Vinianský potok was together with Skalný jarok flowing through the village Klokočov connected to Čierna voda. It was similar in case of Kusínsky and Jovsianský potok that were conducted to Čierna voda on the common confluence. As the width of the riverbed was too small from the point of the used map scale in 1826, these rivers are missing on the maps of land use in that year (table 1).

Comparing the second military mapping maps with a military topographic maps from 1956 one can notice another significant change. It is presented by approx 9 ha Vinianske

jazero that is missing at the map from the second military mapping. In that period of time there were sustainable grasslands. It is not a natural lake. Lake basin was modeled by the mass flows rising under Kyjov. After the marked tectonic movements the currents of water diverted their direction. They were flowing westerly from Šútova or they disappeared. Subsequently, the lake basin was blocked by the artificial reservoir and its donation by water the Viniansky potok. Since the end of the 19th century it was used as fishpond for the carp breeding.

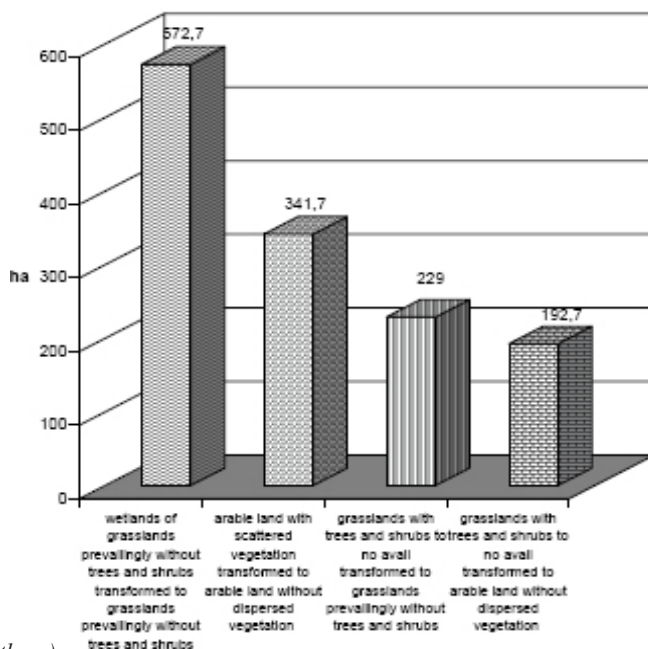
In percentual statements and comparisons of changes in the landscape structure the most dominant was transformation of the sheepfold area into arable soil with scattered vegetation with its 96,8% followed by 81,9% change of the sustainable grasslands without trees and shrubs into sustainable grasslands with trees and shrubs, 81,5% transformation of scrubs into forests and 55,0% change of arable land with scattered vegetation into arable land without scattered vegetation (fig. 2).

Tab. 1: Comparison of selected land use forms in the years 1826, 1956 and 2005

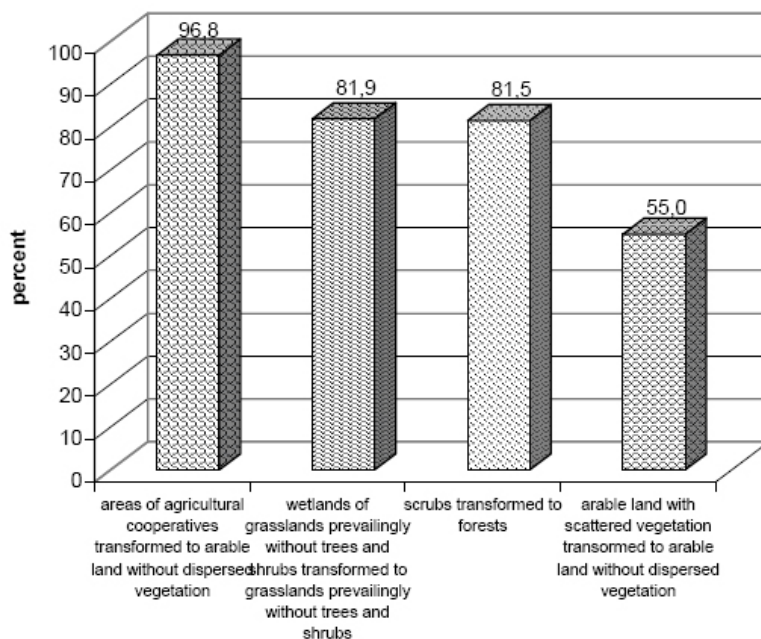
Land use forms		Area (in ha) in the year 1826	Area (in ha) in the year 1956	Difference (in ha) 1826-1956
1	built-up areas with family houses and gardens	129,317	228,2	98,883
2	built-up areas of individual recreation	-	-	-
3	areas of special installations	-	-	-
4	road network associated land	33,096	35,547*	2,451
5	protective dams	-	-	-
6	mineral extraction sites	-	4,421	4,421
7	cemeteries	-	3,561	3,561
8	sports and leisure facilities	-	-	-
9	areas of agricultural cooperatives, sheepfold	4,461	4,303	-0,158
10	arable land without scattered vegetation	1192,904	1900,729	707,825
11	arable land with scattered vegetation	629,466	218,31	-411,156
12	arable land to no avail	-	-	-
13	fruiting vineyards	133,912	177,319	43,407
14	vineyards to no avail	-	-	-
15	fruit trees	-	7,796	7,796
16	grasslands prevailingly without trees and shrubs	465,849	1342,866	877,017
17	grasslands with trees and shrubs to no avail	566,177	300,913	-265,264
18	garden's settlement	-	-	-
19	broad-leaved forests	4078,338	3397,518	-680,82
20	undergrowth	-	51,706	51,706
21	scrubs	33,395	243,493	210,098
22	beaches	-	-	-
23	bank vegetation of the water basins	-	-	-
24	vegetated areas along the water streams	26,293	42,881	16,588
25	water streams and regulated water streams	-	25,065**	25,065
26	artificial water reservoirs	-	9,372	9,372
27	wetlands of grasslands prevailingly without trees and shrubs	700,792	-	-700,792

* In case of transport communications only the most important transport lines were mapped

** Only water flows with minimal width of 13 m were displayed

Fig. 1: Land use changes (in ha) in 130 years (1826–1956)

Source: (authors)

Fig. 2: Land use changes (in %) in 130 years (1826–1956)

Source: (authors)

CONCLUSION

The landscape structure of the studied area has undergone significant changes. In 1826 the studied territory presented the half-natural landscape from the point of its use. The forest areas were covering more than 50% out of total territory, 23% was arable land (with scattered lineary and solitary vegetation but also without it) and 22% sustainable grasslands. There were rapid changes in the property shares in the fifties of the 20th century when the government was forcing the idea of collectivization what was also reflected in the changes of its use. The share of the arable land without scattered vegetation in the absolute values raised in more than 700 ha (8,9%, table 1), what was influenced by the transformation of the unused sustainable grasslands with scattered vegetation (fig. 1). An increasing effort to land use more effectively for agricultural purposes led towards the gradual diminishing of the scattered vegetation, namely from the arable land as well as from the sustainable grasslands.

The original paradynamic system of the Vihorlat mountains and adjacent part of the East Slovakian lowland evoked the marked interference of a man by the physiogeographical structure that was caused by a dominant agricultural function of the whole East Slovakian lowland. Its quality was lowered by the floods and the vast melioration modifications had to be done here.

Acknowledgement: This paper is part of the scientific project APVV No. COST-0016-06 Cultural landscape in Slovakia – regionalization, protection and planning and the scientific project VEGA No. 1/4028/07 Research and geoeological evaluation of changes in the use of cultural landscape in selected foothills region in Slovak republic.

References

- BAŇACKÝ, V., et. al. (1987): Vysvetlivky ku geologickej mape severnej časti Východoslovenskej nížiny. Geologický ústav Dionýza Štúra, Bratislava, 117 s.
- BAŇACKÝ, V., et. al. (1988): Geologická mapa severnej časti Východoslovenskej nížiny. M: 1: 50 000. Geologický ústav Dionýza Štúra, Bratislava.
- BIČÍK, I., JELEČEK, L. (2005): Political Events Factoring into Land-Use Changes in Czechia in the 20th Century. In: Understanding Land-Use and Land-Cover Change in Global and Regional Context, Enfield (NH): Science publishers, Inc., 2005, p. 165–186.
- BOLTIŽIAR, M., (2003): Zmeny krajinej štruktúry vybranej časti belianskych Tatier v období rokov 1949-1998 s využitím výsledkov DPZ a GIS. In: ekologické štúdie. V. Olah, B. (ed.). Banská Štiavnica: SEKOS pri SAV, 2003, s. 164-173.
- BOLTIŽIAR, M. (2005): Spálenisko pod Slavkovským štítom – Zmeny krajinej štruktúry v rokoch 1949-2003 s využitím výsledkov DPZ a GIS. In: Geoinformations: Geografia v kontexte nového regionálneho rozvoja, Nitra: UKF, ISSN 1336-7234.
- CEBECAUEROVÁ, M., CEBECAUER, T. (2005): Vývoj krajinej pokrývky v južnej časti Záhorskej nížiny a malých karpát v období 1954-1992. In: Geoinformations: Geografia v kontexte nového regionálneho rozvoja, Nitra: UKF, ISSN 1336-7234.
- CEBECAUER, T., HOFIERKA, J. (2007): The consequences of land-cover changes on soil erosion distribution in Slovakia. In: Geomorphology (in press).

- DOBROVODSKÁ, M. (2000): Faktory formovania súčasnej štruktúry krajiny marginalních oblastí Slovenska na príklade obcí Liptovská Teplička, Osturňa a Malá Franková. In: Krajina, človek, kultúra – zborník referátov. Banská Bystrica: SAŽP, s. 81-85. ISBN 80-88850-33-9.
- FERANEC, J., et. al. (1997): Analýza zmien krajiny aplikáciou diaľkového prieskumu Zeme. In: Geographia Slovaca, roč. 13, 64 s.
- FERANEC, J., OŤAHEL, J. (1989): Recent Utilisation of the East-Slovakian Lowland's Landscape. Súčasné využitie Východoslovenskej nížiny. In: Geografický časopis, Vol. 41, 1989, No. 2.
- FERANEC, J., OŤAHEL, J. (2001): Krajinná pokrývka Slovenska. Land cover of Slovakia. Bratislava: Veda, 2001, 124 s. ISBN 80-224-0663-5.
- FERANEC, J., OŤAHEL, J., CEBECAUER, T. (2004): Land cover changes – information source about landscape dynamics. Zmeny krajinnej pokrývky – zdroj informácií o dynamike krajiny. In: Geografický časopis, Vol. 56, 2004, No. 1.
- CHRISTINA, P. (2005): Kultúrna krajina Trenčianskej kotliny a okrajov priľahlých pohorí: vývoj využitia. In: Tvár našej zeme – krajina domova. Dodatky. MŽP ČR, Průhonice: Společnost pro krajinu; Praha. s. 101-109. ISBN 80-86512-35-5.
- CHRISTINA, P. (2006): Vývoj využitia kultúrnej krajiny na SV okraji Bakoňského lesa (obce Cáfár, Čerňa a Jášč). In: Kultúra, jazyk a história Slovákov v Maďarsku. Divičanová, A. - Ján-Tóth, A. - Uhrinová, A. eds.: Békešská Čaba VÚS, s. 344-357. ISBN 963-86573-8-3.
- CHRISTINA, P. (2006): Vývoj krajiny Trenčianskej kotliny a jej horskej obruby. In: Krajinařská architektura a proměny historických prostorů. Krejčířík, P. ed. ZF MZaLU, Brno. s. 120-129. ISBN 80-7157823-1.
- CHRISTINA, P., BOLTIŽAR, M. (2006): Kultúrna krajina SV okraja Bakoňského lesa v Maďarsku (súčasnosť v kontexte minulosti). In: Historická geografie - Supplementum I. Šimůnek, R. ed. HÚ AV ČR, Praha 2006, s. 175-188. ISBN 80-7286-093-3.
- HOFIERKA, J. (1993): Geometrická analýza povrchov (2D) a objemov (3D) ako nástroj pre skúmanie dynamických javov prírodnej krajiny v rámci 3D geoinformačných systémov. Kartografické listy, 1, s.107-112.
- HOFIERKA, J. (2003): Geografické informačné systémy a diaľkový prieskum Zeme. Vysokoškolské učebné texty. Prešovská univerzita. Fakulta humanitných a prírodných vied. Prešov.
- IVANOVÁ, M. (2006): Zmeny v krajinnej štruktúre podvihorlatských obcí Vinné, Kaluža, Klokočov, Kusín a Jovsa. In: Geografická revue, roč. 2, 2006, č. 2 s. 130 - 134. ISSN 1336-7072.
- LAPIN, M., et. al. (2002): Klimatické oblasti, č. mapy 27. In: Atlas krajiny SR. MŽP SR, Bratislava, s. 95. ISBN 80 – 88833 – 27 – 2.
- MAZÚR, et. al. (1980): Geoekologické (prírodné krajinné) typy. M: 1: 500 000, In: Atlas SSR. GÚ SAV, Bratislava, s. 98-99.
- MICHAELI, E., (2005): Transformácia využívania kultúrnej krajiny na príklade katastrálneho územia Jakuban za ostatných 50 rokov. In: Folia Geographica, 8, s. 108 – 115. ISSN 1336-6149.
- MICHAELI, E., HOFIERKA, J., IVANOVÁ, M. (2008a): Application of selected landscape diversity methods evaluation of the cultural landscape region in the northern

- hinterland of Zemplin šírava dam. Theory and practis of Czech and Slovak geography in the 21 century. Kapitola v monografii. Brno. 2008. (in press).
- MICHAELI, E., HOFIERKA, J., IVANOVÁ, M. (2008b): Assessment of landscape structure changes over the last 50 years in the hinterland of Zemplínska šírava dam in Slovakia. In: Kabrda, J., Bičík, I. (eds.). Man in the landscape across frontiers: Landscape and land use change in Central European border regions. Conference Proceedings of the IGU/LUCC Central Europe Conference 2007. 2008. ISBN 978-80-86561-80-6 (in press).
- OŤAHEL, J., et. al. (2004): The landscape structure of the distrikt of Skalica: Assessment of changes, diversity and stability. Krajinná štruktúra okresu Skalica. In: Geografia Slovaca 19, Bratislava: SAV, 2004.123 s. ISSN 1210-3519.
- ŽIGRAI, F. (1980): K problému typizácie a regionalizácie využitia zeme. In: Geografický časopis, roč. 32, 1980, č. 4, s. 312-324.
- ŽIGRAI, F. (1994): Štúdium využitia zeme ako integračný faktor medzi fyzickou a humánou geografiou. In: Prírodná časť krajiny, jej výskum a návrhy na využitie. Bratislava: KFG PriF UK, s. 13-15.
- ŽIGRAI, F. (2005): Dimensions and Attributes of cultural Landscape. Dimenzie a znaky kultúrnej krajiny. In: Životné prostredie, Vol. 34, 2000, No. 5.

TRANSFORMÁCIA FYZICKOGEOGRAFICKEJ ŠTRUKTÚRY KRAJINY PARADYNAMICKÉHO SYSTÉMU SEVERNÉHO ZÁZEMIA VODNEJ NÁDRŽE ZEMPLÍNSKA ŠÍRAVA

Zhrnutie

Súčasná štruktúra krajiny je výsledkom dlhodobého antropogénneho pôsobenia človeka na prírodnú krajinu. Interaguje a odráža dôležité informácie o krajinných zložkách, faktoroch, procesoch, ako aj mnohých javoch nemateriálnej podstaty. Je výsledkom ich vzájomného pôsobenia v priestore a čase a vyznačuje sa určitou kvalitatívnou a kvantitatívnou väzbou jej prvkov na dané procesy a javy (Dobrovodská 2000).

Jednou z možností vyhodnotenia zmien v krajinej štruktúre je analyzovať zmeny vo využívaní krajiny v jednotlivých časových horizontoch. Pre tento účel sme využili mapové podklady z druhého vojenského mapovania a vojenské topografické mapy z roku 1956.

Cieľom príspevku bolo analyzovať zmeny vo využívaní krajiny a funkčného zamerania obcí na príklade kontrastného regiónu – paradynamického systému severného zázemia Zemplínskej šíravy.

Výber časových intervalov nebol náhodný. Jeho snahou bolo zachytiť najmarkantnejšie zmeny za 130 ročné obdobie. Z analýzy zmien vo využívaní krajiny vyplynulo, že najväčší vplyv na rozvoj skúmaného regiónu mala kolektivizácia, vplyvom ktorej sa pôvodný poloprírodný charakter skúmaného územia postupne transformoval v kultúrnu krajinu s dominantnou pozíciou poľnohospodárskej a obytno-službovej funkcie.

Recenzovali: Prof. h.c. prof. Ing. Ondrej Hronec, DrSc.
Prof. Ing. Jozef Vilček, PhD.

SECOND HOMES AS A FACTOR OF THE TRANSFORMATION OF RURAL AREAS IN THE POLISH CARPATHIANS

Mirosław MIKA¹, Robert FARACIK²

Abstract: *Holiday making in second homes is at present one of major trends in the development of individual recreation in Poland. Since the late 1990s, high dynamics in the development of secondary residences in attractive tourist areas has been recorded. Owners of secondary residences in the Polish Carpathians are chiefly residents of big cities situated in the Carpathian foothills. The development of second homes is currently one of the most important urbanisation factors in Poland, which in the mountain areas of the Carpathians, causes conflicts stemming from environmental, spatial and functional issues.*

Key words: *second homes, Polish Carpathians, rural areas, tourist urbanisation*

INTRODUCTION

In the 1970s, an important trend in the tourist development of rural areas in Poland was initiated – the building of second homes by city residents (Górz 2007). Second homes are also known as secondary residences, recreational homes, recreational residences or individual holiday homes are considered to be tourist infrastructure facilities (Warszyńska, Jackowski 1978; Kowalczyk 1994, Kurek 2007). Holiday making in secondary residences is now ranked among the most popular and fastest developing forms of leisure for city residents in Poland. Unlike collective accommodation facilities, they serve as recreation facilities for their owners, mostly on weekends and for shorter or longer holiday stays. The spatial aspect of this phenomenon is the settlement development resulting from the building of secondary residences, i.e. individual recreational settlement, being part of widely understood urbanisation processes and contributing to functional change in rural areas (Dziegieć 1995, Kowalczyk 1994).

Presently the development of second homes is one of major tourist urbanisation factors in Poland's rural areas. Secondary residences are built in all areas which have landscape assets (on the seaside, in the mountains and in lake districts). Mostly, they are built in areas with highest recreational assets, in particular in mountain spring valleys, on mountain slopes, in the nearest vicinity of forests, lakes and on the seashore (Kowalczyk 1994, Kurek 2007). Secondary residences are often built in rural areas surrounding cities (suburban zones) (Gaś 1997, Faracik 2006, Matczak 1986, Mika 2004, Szkup 2003, Wiluś 1997, Włodarczyk 1999, Wojciechowska 1998). In this case, the travel to second homes takes no more than one hour and a half (Coppock 1977).

1 **Dr. Mirosław Mika,**

Department of Tourism and Health Resort Management, Institute of Geography and Spatial Management, Jagiellonian University, 30-387 Kraków, ul. Gronostajowa 7

2 **Dr. Robert Faracik,**

Department of Tourism and Health Resort Management, Institute of Geography and Spatial Management, Jagiellonian University, 30-387 Kraków, ul. Gronostajowa 7

The term “second homes” refers to privately owned residential houses, situated in localities which are not places of permanent residence for their owners. The term covers all-year residences built on permanent foundations, wooden summer houses, as well as permanent caravans.

According to A. Kowalczyk (1994), characteristic features of second homes are as follows:

- the facility may be used for recreational purposes,
- the owners' permanent place or residence is outside the locality in which the secondary home is situated,
- the facility is used seasonally,
- it is used by the owner and his/her family,
- it is situated outside urban centres.

The development of secondary residences as may be seen in all developed countries results from city residents' growing demand for country leisure. Often such facilities are regarded by their owners as a good investment or stand as a status symbol (Andriotis 2006).

THE TRADITION OF SECOND HOMES BUILDING IN POLAND

In Poland, the tradition of holiday making in a secondary residence dates back to the second half of the 19th c. The trend for having a house outside the city accompanied the development of tourism and tourist localities on the Baltic coast, in the Carpathians and around big cities, in particular Warsaw, in the inter-war period (1918-39). At that time this phenomenon was only associated with the elite and second homes often took the form of country residences of the wealthy aristocracy or businessmen.

Having a second home became popular in Poland no earlier than on the turn of the 1960s/1970s, in a period of intensive urbanisation and industrialisation. The Polish legislation on spatial planning and construction provides that special areas may be allocated for recreational purposes if they appear to be useless for agricultural production and offered opportunities for the building of summer houses. Under a communist economy system, local authorities used to have some regulatory powers to allocate special zones for recreational housing. This brought about the development of summer residence settlement, characterised by a high spatial concentration of structures on the small areas of building plots (usually a few hundredths of a hectare), impermanent housing structures and poor or non-existent water and sewage infrastructure. Apart from small, wooden houses, grand villas were also built. Another way to acquire one's own recreational residence under the past socio-political system was to adapt deserted or inherited farm buildings for recreational purposes.

The main group of owners or leaseholders of recreational plots in the 1960s and the 1970s were political and army officials, managers of industrial plants and individuals rewarded by the authorities for some reasons. In the 1980s, representatives of other social groups – physicians, academics, employees of prosperous enterprises or the privileged industries (e.g. miners) – joined the group of owners of second homes. One of the factors which contribute to the development of secondary residences in Poland in the 1970s was individual motorization, which in Poland occurred as a result of an increasing popularity of the Fiat 126p (Szkup 2003).

The 1990s have brought a complete change in the conditions of the development of recreational residences in Poland. With the market economy development, social privileges or a place on the social ladder have no longer been decisive for a possibility to acquire a private recreational house, as financial means available have become of main importance. The liberalisation of the regulations on land distribution after 1989 has had particularly beneficial results for secondary residences development.

THE PRESENT ISSUES OF THE DEVELOPMENT OF SECOND HOMES IN POLAND

It is difficult to assess precisely the extent of the secondary residence phenomenon in Poland. Though some studies provide data for individual localities, there are no precise data on the number of such facilities in the country as a whole. It is difficult to assess the scale of this phenomenon within a permanent settlement system. Secondary residences are recreation facilities showing great dynamics as they spread “discreetly”, so the estimation of the scale of the phenomenon requires intensive field studies. Often such residences cease to serve a recreational function as their owners move to live there, so the houses become permanent residences, particularly in suburban zones.

Recently published complete data are from 1980. They indicate that there were 44,000 recreational residences in Poland at that time. However, it may be assumed that currently their number is several times higher. Current studies of this phenomenon have revealed that, e.g. in the Beskid Śląski region there are around 3,600 second homes, in the Warsaw suburban zone over 11,000, in the Łódź suburban zone around 10,000, while in the Kraków suburban zone around 3,000 (Faracik 2006, Kowalczyk 1994, Mika 2004, Szkup 2003).

Recreational residences in Poland develop chiefly in the following two types of areas:

- a) areas surrounding towns and cities (suburban zones),
- b) tourist regions, attractive in terms of their natural assets.

The spatial distribution of this phenomenon is also influenced by the distribution of areas with high environmental assets in the vicinity of conurbations and good transport access. This type of settlement is developing rapidly on the Baltic coast, in the Mazurskie and Kaszubskie Lake Districts, in the Beskid Zachodni hills. in the Sudety (Sudeten) Foothills, the Jeleniogórska Valley, in northern Wielkopolska, in suburban zones of Warsaw, Kraków, Łódź and Poznań, as well around Lublin, Szczecin, Wrocław and Częstochowa.

The demand for one's own recreational home in Poland stems for the same reasons as in other developed countries; these include the worsening of the living conditions in conurbations, the development of individual motorisation, higher amounts of free time and a generally greater wealth of the society (Dziegieć 1995).

Following the data of 2007, 61.3% (23.4 million) residents of Poland live in towns, of which 11.01 million live in 39 cities with populations exceeding 100,000, accounting for 28.9% of the total population. Town residents usually build secondary residences to take a rest outside the urban environment in areas which are quite and close to nature.

An important factor influencing an increased demand for having one's own recreational house is a significant growth of people's revenues compared with the '1990s. According to the General Statistical Office data, in 2005 an average level of GDP per head in Poland was PLN 25,000, (in 2000 – PLN 9,400), i.e. 50,7% of the EU average. In the years 1995-2005 an average annual GDP growth rate was at the level of 11.3%. A growth of income

is recorded chiefly for residents of big cities, such as Warsaw, where an average income per is a triple of the country's average, along with Poznań (twice the country's average), Kraków and the Gdańsk – Sopot – Gdynia conurbation (1.5 of the country's average), as city residents are the largest beneficiaries of the socio-economic transformation.

Due to the amendments to planning regulations in the 1990s, the growing scope of competences of local authorities in land management and the application of market rules to land acquisition, three development models may be distinguished in the development of the secondary residence phenomenon in Poland:

- A) within recreation areas allocated for this specific purpose, as was previously the case;
- B) through adaptive reuse of abandoned farm buildings for recreational purposes;
- C) building of an all-year secondary residence within the system of the village permanent settlement.

The most popular model in Poland is the development of second residences in localities situated in areas allocated for permanent development. This way of development of second homes is characterised by a significant liberty in location of such residences. They are all-year houses, built on permanent foundations, but they are used by their owners for recreational purposes on days out of work. They are built on land purchased from private owners. They are not registered as recreational houses but as typical residential houses, so no separate register is kept for them and there are no special regulations involved.

The legislation presently in force provides that local authorities are free to allocate land in poor soil areas (bonitation classes V and VI) owned by the communes for non-agricultural uses for holiday housing. However, the development of holiday homes raises a lot of controversies regarding environmental and landscape protection, so planning documents do not envisage such development in localities in landscape parks and health resorts. On the other hand, in localities which make such areas available the practice to allocate and sell larger plots for this purpose is becoming widespread in order to avoid excessive concentration of buildings.

SECOND HOMES SETTLEMENT AS A FACTOR OF URBANISATION OF RURAL AREAS IN THE POLISH CARPATHIANS

Villages which are attractive for tourism purposes are generally characterised by a high demography dynamics which often results in a significant increase in the number of new houses built in addition to existing development (Górz 2003). This leads to significant transformations in the village spatial layout, and sometimes to new developed areas within a locality. Such processes have been recorded in many Polish Carpathian villages, but the localities in which large numbers of secondary residences have been built recently show the greatest physiognomic and spatial changes in rural architecture and settlement.

It may be assumed that around 12,000-15,000 individual houses performing the recreational role may be found in the Polish Carpathians. The largest numbers of secondary residences have been built in Silesian Beskid (mainly in Brenna, Wisła, Szczyrk and Ustroń), the Beskid Żywiecki, Beskid Sądecki and Beskid Wyspowy Mts, in the Podhale and in the Carpathian foothills (Fig. 1). Such facilities show a high concentration in river valleys and by artificial lakes (Roznowskie and. Żywieckie Lakes). An important area

of the concentration of secondary residences is the Raba river valley, where the largest numbers of such residences have been built within the boundaries of the Myślenice and Peim communes. In these regions secondary residences often constitute over a half of existing rural development areas. Outside these areas, many such facilities may be seen on the slopes of Mt Babia Góra and in the villages of Zawoja and Stryszawa. It is also present on the dam lakes on the Dunajec, Soła and San rivers. Recently, a growing interest in buying plots in the Bieszczady (in particular in the Solina commune) and in the Beskid Niski, as well as in other parts of the Carpathians, has been noted.

Owners of secondary residences in the Polish Carpathians are mostly residents of large conurbations situated near the Carpathin foothills, such as the Upper Silesian conurbation (2.8 million residents) with neighbouring Rybnik agglomeration (0.6 million), the Kraków metropolitan area with satellite towns (0.8 million), Bielsko-Biała (0.18 million), Rzeszów (0.17 million) and Tarnów (0.12 million). Considering the importance of the Carpathians as Poland's recreational area, residents of other regions of the country (in particular Warsaw) also have their own recreational houses there.

The highest investment pressures have been originated (and may still be seen) in the central part of the Śląskie Voivodeship, where an average population density reaches around 1,900 persons/km². Residents of the Upper Silesian conurbation own second homes in the western part of the Beskidy Mts – Beskid Śląski (Fig. 2.) and Beskid Żywiecki, Żywieckie Lake, as these areas are not far from this conurbation and fast access is available. Kraków residents build their recreational houses nearby in the foothill area and in the Raba and Dunajec river valleys. A good transport access is the basic factor determining the spatial distribution of the facilities discussed. However, as an area becomes densely built-up with secondary residences and land prices go up, city residents begin to seek new, attractive locations which may still be poorly developed.

In quest for quietness, serenity and close contact with nature, city residents build secondary residences outside high-density housing areas. Such facilities are often located in the areas where permanent residences would not be built – on the steep slopes, in the direct vicinity of water, or at a large distance from residential areas.

In the Polish Carpathian mountains second homes are usually built (see Fig. 3):

- A) on the slopes, far from permanent residence areas, near the woods (A1), on forest clearings (A2) or by mountain springs (A3),
- B) along the roads on the slopes,
- C) on the border with permanent residence areas,
- D) within a permanent residence (D1) area or in the hamlets (D2),
- E) in areas between villages or between a village and its hamlets (Mika 2004).

It may be seen that the features of secondary residence locations strictly follow Christaller's model for tourism and recreation location (theory of peripheral areas) (Kowalczyk 1994), which assumes that places distant from human settlements and urbanised areas are particularly attractive in meeting the demand for tourist and recreational opportunities.

A demand for private residences outside the city is so high that secondary homes often concentrate in characteristic clusters (estates). Usually it is a result of:

- the parcelling out and selling of several or more than ten neighboring plots by one owner;

- the purchase of neighboring plots by their prospective owners because of their landscape assets, being close to the forest or water or in order to reduce the costs of the technical infrastructure by joint investment in the building of water intakes and access roads;
- a concentration of secondary residences on a smaller area resulting from the fragmentation of plots available for holiday homes as a result of the growing land prices.
- the allocation of areas for such development in local plans (Faracik 2006; Mika 2004; Szkup 2003).

Among the reasons for the rapid growth in the number of secondary residences in the mountains are economic gains for village residents from the selling the land. In some Carpathian villages local people consider the selling of plots for recreational houses as an easy way to earn money rapidly. This situation occurs in high unemployment areas being attractive locations for holiday housing development. Often local residents pressure on the local authorities to make more agricultural land available for housing development in their planning documents. Land is also underpriced, which is an additional factor stimulating a demand for recreational areas (Mika 2001).

In some parts of Poland, in particular in the Polish Carpathians, the development of individual recreational housing settlements and the resulting changes in land uses have changed the natural landscapes into urbanised, and sometimes even highly urbanised landscapes. “Recreational conurbations” consisting of several dozen or even a few hundred facilities may be seen in some places. Sometimes an excessive concentration of buildings and the disordered, chaotic architecture involved spoil the easthetic appeal of mountain landscapes. Numerous examples of secondary residences which do not meet technical and sanitary requirements and are located outside the planned development area and constitute a land use violation, are particularly harmful to the environment. In many rural settlements the development of the local water and sewage system lags behind the rapid development of recreational settlements. As a result, the chaotic, poorly planned development of secondary residences often leads to a deterioration of tourist assets of the localities in question.

CONCLUSIONS

Holiday making in second homes has currently become a leading trend in individual recreation in Poland. Since the 1990s, a real secondary residence boom has been recorded in Poland and is likely to continue in the nearest future. It will be accompanied by an intensified process of residents moving away of the cities to live in the country, in particular as regards people reaching the retirement age. So this form of recreation may be considered a symptom of urban sprawl in metropolitan areas, and, in its social context, the suburbanisation of certain social groups in the cities.

Secondary recreational residences play an important role in the transformation of rural recreational areas in the Polish Carpathians. This is a permanent phenomenon, developing further as a result of urban sprawl and the increasing prosperity of residents. In terms of settlement patterns, this phenomenon contributes to permanent investment and urbanisation in rural areas of tourist interest. Sometimes, e.g. in areas surrounding national

parks (e.g. Babiogórski National Park) development is in conflict with the environmental protection function.

The following characteristics are important determinants of the development of second residences in the Polish Carpathians:

- a) the process dynamism and spontaneity,
- b) permanent development,
- c) spatial concentration,
- d) spatial isolation,
- e) development in areas which have natural and landscape assets,
- f) highly space-consuming development.

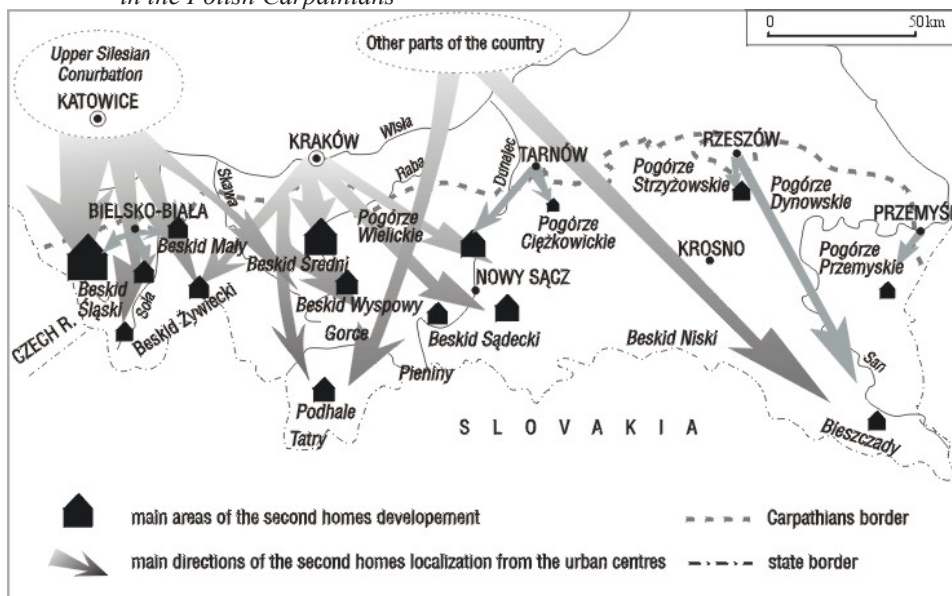
The rapid sprawl of secondary residences results in a shrinking space for recreation in the mountain regions. Development in upper parts of the mountains brings permanent change to their landscapes. While adjusting the area to tourist reception purposes, it reduces a tourist's opportunity to benefit the natural assets. All negative effects of tourist management, e.g. overcrowding the space with facilities, architectural pollution, disorderly development disregarding aesthetic values in managing the tourist space – all this may contribute to a subjective loss in the area's attractiveness and leads to reduced flows of incoming tourism, as the visitors' views on tourist localities and regions attractiveness are connected with a psychological process of how they perceive the environment in which they stay on holiday. Therefore the planning of new tourist infrastructure and modernisation of existing facilities, both collective tourist accommodation and secondary residences, is an issue of a great importance.

References

- ANDRIOTIS, K. (2006): Host, Guests and Politics, Coastal Resorts Morphological Change, *Annals of Tourism Research*, 33, 4, 1079–1098.
- COPPOCK, J.T. (1977): *Second homes: curse or blessing?*, Oxford Press, Oxford.
- DZIEGIEĆ, E. (1995): Urbanizacja turystyczna terenów wiejskich w Polsce, „*Turyzm*” 5, 1, Łódź, 5-56.
- FARACIK, R., (2006): *Turystyka w strefie podmiejskiej Krakowa*, Wydawnictwo Instytutu Geografii i Gospodarki Przestrzennej UJ, Kraków.
- GARTNER, W. (1986): Environmental Impacts of Recreational Home Developments, *Annals of Tourism Research*, 13, 38-57.
- GAŚ, M. (1996-1997): Drugie domy jako element zagospodarowania turystycznego wsi w strefie podmiejskiej Krakowa, *Folia Geographica, Seria Geograph.Oecon.*, nr 29-30. Wyd. PAN, Oddział Kraków.
- GÓRZ, B. (2003): *Społeczeństwo i gospodarka Podhala w okresie transformacji*, Wyd. Naukowe Akademii Pedagogicznej w Krakowie.
- GÓRZ, B. (2007): Funkcje turystyki na obszarach wiejskich, [w:] W. Kurek, M. Mika (red.), *Studia nad turystyką. Tradycje, stan obecny i perspektywy badawcze. Geograficzne, społeczne i ekonomiczne aspekty turystyki*, Instytut Geografii i Gospodarki Przestrzennej, Uniwersytet Jagielloński, Kraków, 221-234.
- KOWALCZYK, A. (1994): *Geograficzno-społeczne problemy zjawiska drugich domów*, Uniwersytet Warszawski, Warszawa.

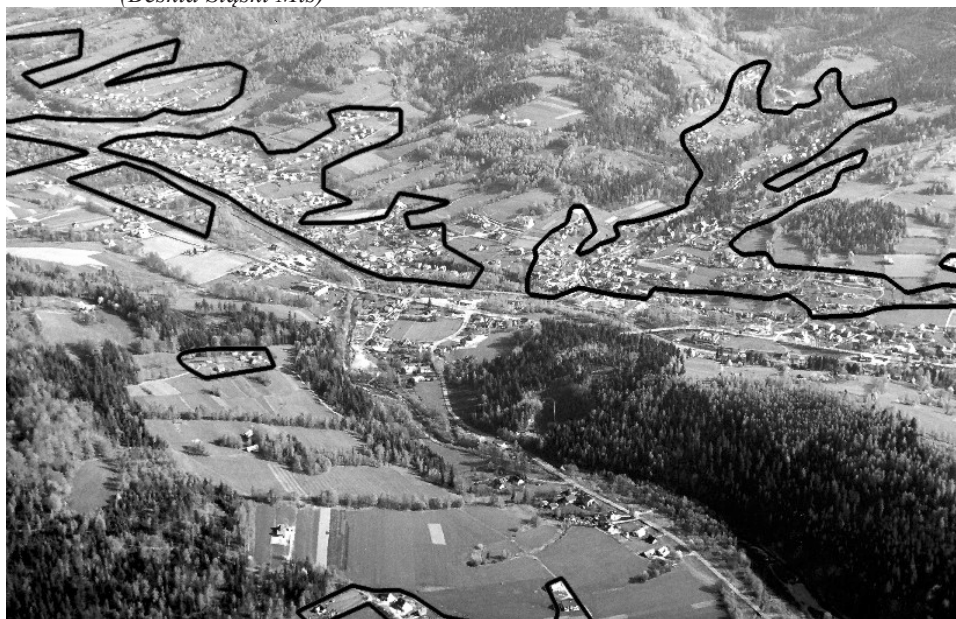
- KUREK, W. (1990): Wpływ turystyki na przemiany społeczno-ekonomiczne obszarów wiejskich polskich Karpat, Rozprawy habilitacyjne UJ nr 194, Kraków, 136.
- KUREK, W. (2004): Turystyka na obszarach górskich. Wybrane zagadnienia, Inst. Geogr. i Gosp. Przestrz. UJ, Kraków, 204.
- KUREK, W. (RED.) (2007): Turystyka, Wyd. Nauk. PWN, Warszawa.
- MATCZAK, A. (1986): Budownictwo lotniskowe w strefie podmiejskiej Łodzi, Acta Universitatis Lodziensis, Folia Geographica, 7, 37-165.
- MIKA, M. (2001): Współczesne przemiany i zagrożenia środowiska przyrodniczego Beskidu Śląskiego związane z turystyką, [w:] German K., Balon J. (red.), Przemiany środowiska przyrodniczego i jego funkcjonowanie, Problemy Ekologii Krajobrazu, 10, Kraków, 742-748.
- MIKA, M. (2004): Turystyka a przemiany środowiska przyrodniczego Beskidu Śląskiego, Instytut Geografii i Gospodarki Przestrzennej, Uniwersytet Jagielloński, Kraków.
- SZKUP, R. (2003): Kształtowanie podmiejskiej przestrzeni wypoczynkowej. Przykład zachodniego sektora strefy podmiejskiej Łodzi, Wyd. Uniw. Łódzkiego, Łódź.
- PTASZYCKA-JACKOWSKA, D. (2007): Gospodarowanie w przestrzeni turystycznej, [w:] W. Kurek, M. Mika (red.), Studia nad turystyką. Tradycje, stan obecny i perspektywy badawcze. Geograficzne, społeczne i ekonomiczne aspekty turystyki, Instytut Geografii i Gospodarki Przestrzennej, Uniwersytet Jagielloński, Kraków, 205-222.
- WARSZYŃSKA, J., JACKOWSKI, A. (1978): Podstawy geografii turystyki, PWN, Warszawa
- WILUŚ, R. (1997): Rozwój funkcji turystycznej w dolinie rzeki Warty na odcinku od Działoszyna do Uniejowa, Szlakami Nauki, 24, Łódzkie Towarzystwo Naukowe, Łódź.
- WŁODARCZYK, B. (1999): Przemiany form aktywności turystycznej. Przykład krawędzi Wyżyny Łódzkiej, Łódzkie Towarzystwo Naukowe, Łódź.
- WOJCIECHOWSKA, J. (1998): Kolonizacja turystyczna terenów napilicznych, Szlakami Nauki, 26, Łódzkie Towarzystwo Naukowe, Łódź.

Fig. 1: Main areas for the development of secondary residences in the Polish Carpathians



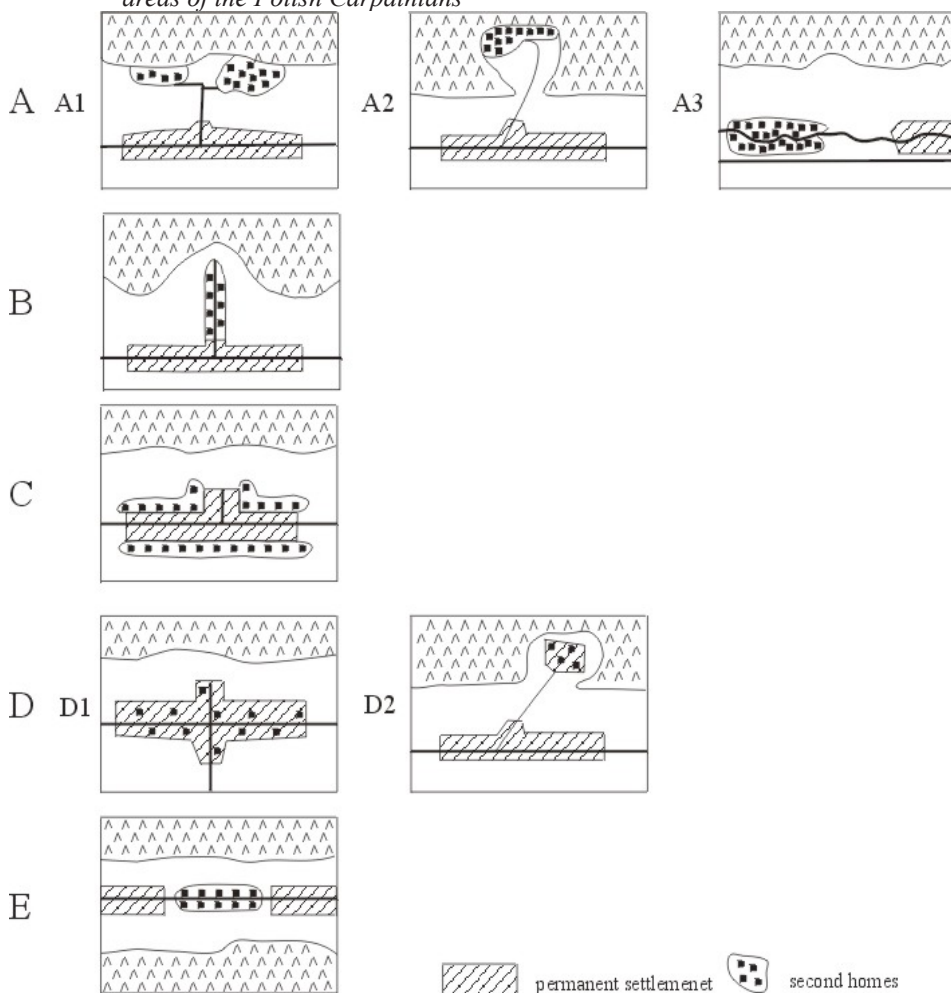
Source: Own study

Fig. 2: Areas of intensive second homes development in Brenna village (Beskid Śląski Mts)



Source: Mika (2004)

Fig. 3: *Characteristic features of secondary residence locations in the mountainous areas of the Polish Carpathians*



Source: Mika (2004)

DRUGIE DOMY JAKO CZYNNIK TRANSFORMACJI OBSZARÓW WIEJSKICH KARPAT POLSKICH

Summary

Wypoczynek w drugich domach jest współcześnie jednym z głównych kierunków rozwoju indywidualnej rekreacji w Polsce. Od lat 90. XX w. obserwuje się dużą dynamikę rozwoju drugich domów na obszarach atrakcyjnych turystycznie. Właścicielami drugich domów w Karpatach Polskich są przede wszystkim mieszkańcy dużych miast położonych u podnóża Karpat. Budownictwo drugich domów jest współcześnie jednym z najważniejszych czynników urbanizacji turystycznej terenów wiejskich w Polsce, co

na obszarach górskich Karpat prowadzi do powstawania konfliktów przyrodniczych, przestrzennych i funkcjonalnych. Wraz rozwojem gospodarki rynkowej od lat 90. XX w. elementem decydującym o możliwościach posiadania własnego domu rekreacyjnego nie są już przywileje społeczne czy miejsce w hierarchii społecznej lecz zasoby finansowe obywateli. Szczególnie sprzyjającym czynnikiem rozwoju drugich domów stała się liberalizacja przepisów w obrocie gruntami.

Na obszarze Polskich Karpat zlokalizowanych jest około 12-15 tys. indywidualnych domów pełniących funkcję rekreacyjną. Najwięcej drugich domów powstało w Beskidzie Śląskim, w Beskidzie Żywieckim, w Beskidzie Sądeckim, Beskidzie Wyspowym, na Podhalu oraz w części pogórskiej Karpat. Duża koncentracja tych obiektów występuje w dolinach rzecznych oraz nad sztucznymi zbiornikami (Jez. Rożnowskim, Jez. Żywieckim). Ważnym obszarem koncentracji drugich domów jest dolina Raby. Ponadto jest ono też obecne nad jeziorami zaporowymi istniejącymi na Dunajcu, Sole i Sanie. W ostatnich latach rośnie zainteresowanie wykupem działek w Bieszczadach (szczególnie na terenie gminy Solina) i Beskidzie Niskim, a także w innych obszarach Karpat i Pogórza Karpackiego. Właścicielami drugich domów w Karpatach Polskich są przede wszystkim mieszkańcy dużych zespołów miejskich położonych u podnóża Karpat, a więc: aglomeracja Górnego Śląska (2,8 mln mieszkańców), aglomeracja rybnicka (0,6 mln), aglomeracja Krakowa z miastami satelitarnymi (0,8 mln), Bielsko-Biała (0,18 mln), Rzeszów (0,17 mln) oraz Tarnów (0,12 mln). Z uwagi na ogólnopolską rangę Karpat jako regionu wypoczynkowego, własne domy rekreacyjne na tym obszarze posiadają także mieszkańcy innych części kraju, szczególnie Warszawy.

Drugie domy są współcześnie ważnym czynnikiem przekształceń wiejskiej przestrzeni rekreacyjnej w polskich Karpatach. Zjawisko to ma trwały charakter i stale się rozwija na skutek rozprzestrzeniania się miast i wzrostu zamożności społeczeństwa. Jako zjawisko osadnicze przyczynia się to trwałego zainwestowania i urbanizacji atrakcyjnych turystycznie terenów wiejskich. Charakterystycznymi cechami tego zjawiska są: dynamizm i żywiołowość, trwałych charakter budownictwa, koncentracja przestrzenna, izolacja przestrzenna, zajmowanie obszarów cennych przyrodniczo i krajobrazowo oraz znaczna konsumpcja przestrzeni. Efektem szybkiego rozprzestrzeniania się drugich domów jest kurczenie się górskiej przestrzeni rekreacyjnej. Zagospodarowywanie wyższych partii gór zmienia na trwałe ich cechy krajobrazowe. Przystosowując przestrzeń do recepcji ruchu turystycznego, ogranicza się równocześnie turyście możliwość korzystania z naturalnych walorów przyrody, zaś wszelkie negatywne przejawy zagospodarowania drugimi domami, np. przeładowanie przestrzeni obiektami, zanieczyszczenie architektoniczne, brak ładu i estetyki w gospodarowaniu przestrzenią, mogą przyczynić się do obniżenia atrakcyjności turystycznej miejscowości i prowadzić do zmniejszenia wielkości przyjazdowego ruchu turystycznego.

Recenzowali: Prof. RNDr. Eva Michaeli, PhD.

RNDr. Radoslav Klamár, PhD.

LES FILIERES LAITIÈRES SLOVAQUES : DE LA TRADITION A L'EUROPE

Daniel RICARD¹, Tatiana MINTÁLOVÁ²

Abstract: Slovakia has a genuine milk producing tradition and an important cheese heritage. It greatly owes it to Valaks, who were shepherds come from the Balkans: they spread sheep breeding in all the Carpathians together with a cheese know-how, especially with the bryndza cheese-making. In 1874 the flock reached 2,974,658 sheep, before considerably declining to 276,365 in 1945. In 1948, Slovakia had yet remained a sheep breeding land, when communist regime started deep structural upheavals. Kolkhozes replaced family agriculture, cattle breeding was prioritized by state and was spread in the whole country, and a network of modern factories producing dairy products was created. To put it in a nutshell, they moved to intensive, productive and industrial systems, in complete breaking with the past.

After 1989, new upheavals occurred with the passage to market economy and firm privatizing. Milk production which reached 1,995,000,000 litres in 1989, dropped to one billion litres. It still comes from large farms (average quota of 921,000 litres, the highest in Europe), which have turned into new cooperatives or private societies. A part of the production is made at altitude, especially in Spiš, Liptov, Turiec and Orava. But the most of that production comes from the Danube plain, thanks to very large and intensive farmings combining both cereals and breeding. The transformation tool inherited from the communist era also knew great difficulties after 1989, before adapting itself to the new market state: only the most important and performing factories have survived. Many of them have been bought out by occidental milk groups looking for good-quality milk and performing tools. So dairies are now largely owned by Austrians, Germans, Dutchmen and mainly French, with the cheese group Bongrain. This industry delivers a diversified range of products (liquid milk, butter, powdered milk, yogurts, cheeses, ...) it seems quite dynamic. Today, these Slovak channels present several specificities in the E.U.

1 – The big farmings, providing the essential of production, seem to be awaiting they have got a large potential of production, but lack cashflow and cannot invest enough to improve a too low productivity.

2 – relationships among these professionals seem quite different from what exists in the western countries with companies which first try to sign contracts with large farms, possibly scattered, rather than establishing genuine production areas, like in western Europe.

3 – Specific cheeses, connected to a given region and a know-how, are numerous (parenice, oštiepok, korbačiky, bryndza,...) but they are submitted to a certain standardization which penalizes their quality, and are confronted with the problem of name protection.

1 **Prof. Daniel Ricard,**

Professeur de géographie CERAMAC, MSH, 4 rue Ledru, 63037 Clermont-Ferrand, France, ceramac@univ-bpclermont.fr

2 **RNDr. Tatiana Mintálová, PhD.,**

Department of Geography and Regional Development, University of Prešov, Ul. 17. novembra 1, 08016 Prešov, Slovakia, tami@unipo.sk

Bryndza ranks first concerning those interrogations with an obvious industrialization of its transformation. Only 2,000 tons are produced, but bryndza remains the Slovakia emblematic cheese.

Key words: Slovakia, milk, cheeses, food processing industry, post-communism transition, bryndza, cheese tradition.

Lors de son adhésion à l'Union Européenne en 2004, la Slovaquie s'est vue attribuer un quota laitier d'un milliard de litres, ce qui en fait une puissance laitière toute relative : à peine la production d'un seul département breton. Toutefois, le pays présente un certain nombre de spécificités : une vraie tradition d'élevage ovin, un patrimoine fromager de premier ordre, des outils de transformation globalement efficaces et des filières assez bien structurées.

I - LE POIDS DE L'HISTOIRE

La Slovaquie est très fortement marquée par toute une série d'héritages qui, du moyen âge à la période contemporaine, ont contribué à façonner les filières laitières actuelles.

A - L'héritage valaque

Les Carpates slovaques, vaste massif montagnard culminant à 2 655 m d'altitude, furent précocement parcourues par les Valaques, des bergers venus des Balkans qui diffusèrent l'élevage ovin dans toute la chaîne, en s'appuyant localement sur les pâturages d'altitude. Ils véhiculèrent également tout un savoir-faire fromager, et notamment la technique complexe de fabrication de la bryndza, un produit spécifique confectionné dans les chalets de montagne (*salaš*), sitôt après la traite des brebis.

Cette double tradition d'élevage ovin et de transformation fromagère se retrouve au XIXe siècle dans des Carpates surpeuplées et les effectifs atteignent leur maximum historique en 1874 avec 2 974 658 têtes (Mintálová, 2004). Cet élevage s'accompagne d'une transformation fromagère destinée à l'autoconsommation, mais également au négoce alors que, dans la plaine, les grands troupeaux des vastes domaines aristocratiques hongrois privilégient la production de viande et plus encore de laine, grâce aux brebis mérinos.

B - Une lente crise de l'élevage ovin

La période 1880-1950 est en revanche celle d'un fort déclin, avec des effectifs qui s'écroulent : 1 288 638 têtes en 1910 ; 660 658 en 1920 et 276 365 en 1945 ! La bryndza n'échappe pas à la tendance générale, en dépit de mesures de relances prises par l'Etat dans les années trente.

Selon J. Heteš¹, 6,4 % du lait était collecté en 1948 par soixante et une unités de transformation, contre 49 % en Bohême et 51 % en Moravie, ce qui souligne l'emprise de l'autoconsommation. Le troupeau, très majoritairement montagnard, livre alors trente et un millions de litres de lait. Une partie est transformée en bryndza, surtout à l'est d'une ligne Martin/Banská-Štiavnica, exception faite des montagnes ruthènes. Les dix-huit fromageries qu'il recense se trouvent surtout dans les bassins intramontagnards de Zvolen, du Turiec, du Liptov, du Spiš, ainsi que vers Prešov et Kosiče. Le troupeau bovin, à 75 % de race Simmental, est surtout concentré dans les vallées du Váh et de la Nitra, de l'Ondava et du Laborec, ainsi que dans les montagnes de l'Orava, des Kysuce et du Spiš.

C - La période communiste : un bouleversement de l'élevage

Cette période est décisive, avec plusieurs évolutions majeures qui influencent fortement les filières.

- Tout d'abord, les structures de production du lait sont bouleversées, et la collectivisation se traduit par une concentration très forte autour de quelques fermes d'Etat et surtout de grandes coopératives. Le troupeau moyen atteint 90 vaches en 1990, avec de nombreux cas de gigantisme bien plus impressionnants. La production privée est réduite à la portion congrue.
- Le régime privilégie l'élevage bovin, beaucoup plus productif, c'est une rupture majeure. Avant la guerre, en effet, la Slovaquie était un foyer d'élevage ovin et ignorait presque les vaches laitières quand celles-ci étaient nombreuses en Bohême et en Moravie. Il n'y a désormais plus de discontinuité et la Tchécoslovaquie produit 6 888 millions de litres de lait de vache en 1989, dont 30 % pour la Slovaquie, au second rang des démocraties populaires derrière la Pologne.
- Cet élevage connaît une très nette intensification afin de répondre aux objectifs du Plan. On fait une bonne place à la race Holstein, on adopte l'ensilage d'herbe et/ou de maïs et les aliments concentrés pour le bétail, on étend les prairies temporaires et on use – et on abuse – de l'engrais azoté. Toutefois, l'intensification s'avère moins efficace qu'à l'Ouest et le rendement moyen par vache ne dépasse pas 3 800 litres en 1989 contre 4 564 litres en France et 5 999 litres au Danemark.
- Cet élevage se diffuse un peu partout. En altitude, il valorise les herbages, même si l'on n'hésite pas à faire venir des aliments de la plaine céréalière. Dans le bas du pays, les bovins sont nourris à l'auge dans de très gros ateliers. Au final, on observe une diffusion quasi généralisée des ateliers laitiers dans tout le pays.
- La transformation s'appuie sur des unités de bonne taille qui répondent au processus d'industrialisation socialiste et livrent toute la gamme des produits laitiers, sans spécificités particulières. La Laiterie Centrale de Bratislava occupe une place essentielle dans ce dispositif très centralisé.

Quarante ans d'économie planifiée ont donc bouleversé profondément et durablement le secteur laitier slovaque, donnant naissance à des filières intensives, résolument productivistes et industrielles, assez performantes mais en rupture totale avec le passé.

II - LES FILIERES SLOVAQUES CONTEMPORAINES

Comme partout ailleurs en Europe centrale, la période qui s'ouvre en 1989 se traduit par de nouvelles et profondes mutations. Près de vingt ans après la Révolution, toutes les fermes d'Etat ont été privatisées, mais elles étaient peu nombreuses. Les coopératives, elles, ont adopté de nouvelles structures juridiques (nouvelles coopératives, sociétés...) tout en conservant assez largement leur assise foncière. Les exploitations familiales sont pour leur part peu nombreuses. Quand aux micro-exploitations issues notamment des lopins individuels, elles n'ont guère de réalité économique.

A - L'amont : une organisation spécifique de la production

On est frappé par l'effondrement de la production laitière à l'Est. Ainsi, en Slovaquie, passe-t-on de 1 995 millions de litres en 1989 à 1 331 millions en 1992 avant de tendre

vers le milliard de litres. La réadaptation brutale des structures, l'entrée non préparée dans l'économie de marché, la réduction des aides de l'Etat, le recul de la demande intérieure expliquent ce spectaculaire déclin. Au-delà, l'agriculture a changé de nature, et le temps n'est plus à la recherche des volumes sans se soucier de l'écoulement des produits ni des conséquences environnementales. On semble finalement trouver un nouvel équilibre et, depuis la fin du siècle, la production n'arrive pas à retrouver le chemin de la hausse, au grand dam des négociateurs slovaques qui faisaient état d'un fort potentiel de croissance lors des négociations liées à l'élargissement. Bratislava demandait 1 200 millions de litres. Le quota attribué ne sera que de 1 010 680 000 litres.

1 – Un monde de très gros producteurs

La production laitière est largement issue d'entreprises qui ont repris les structures foncières d'avant 1989. Sociétés et nouvelles coopératives livrent ainsi 984 millions de litres contre seulement 67,6 pour les exploitations individuelles (RGA, 2001). C'est là une des spécificités slovaques : la propriété privée de la terre a été réaffirmée, les biens spoliés restitués, mais les structures d'exploitation se sont largement maintenues. Il faut dire que la Slovaquie de Mečiar (1993-1998) avait opté pour un relatif statu quo, en partie sous l'influence des directeurs de coopératives, soucieux de préserver l'outil de production. Aujourd'hui, le développement d'une agriculture familiale reste incertain et les grosses exploitations sont jugées comme les mieux armées pour préparer l'avenir.

2 - Du lait... à peu près partout

En Slovaquie, la production laitière occupe presque tout le territoire, et seuls onze *okres* sur soixante et onze livrent moins de cinq millions de litres.

- Une partie significative de cette production vient de la montagne, notamment des dépressions du Spiš, du Liptov, du Turiec et de Zvolen. Ici, entre 400 et 800 m d'altitude, les hivers sont rudes, mais les sols sont assez bons et les pentes faibles. La production est également importante dans les montagnes de l'Orava. Les Beskydes ruthènes, très boisées, et les Basses Tatras, plus abruptes, sont en revanche en retrait. Partout, cette production reste intensive, héritage d'un schéma marxiste de production qui niait l'obstacle du milieu naturel. On a donc recours aux prairies temporaires, aux céréales, à l'ensilage, au maïs fourrage si le climat le permet, et cette attitude semble toujours bien présente chez les directeurs de coopératives.
- L'épicentre de la production se situe toutefois dans les basses terres danubiennes : soixante-dix millions de litres dans l'*okres* de Dunajská-Stréda, quarante-huit à Komárno, trente-huit à Nové-Zamky, trente-six à Trnava... C'est le domaine des gros troupeaux et des vastes exploitations associant labours et élevage. Les cultures offrent une nourriture compétitive à ce bétail qui, en retour, fournit une fumure organique bienvenue. Une même logique se retrouve vers Prešov (37 millions de l) et Košice (36 millions) et dans la plaine orientale, mais avec des performances plus nuancées. Ce lien étroit entre production laitière et système céréalier est une vraie spécificité slovaque, à l'opposé du schéma français où l'on observe un très net effacement de l'élevage laitier dans les plaines céréalières.

B - Une industrie laitière en mutation

1 - De l'artisanat à la grande industrie socialiste

Jusqu'en 1945, l'outil de transformation slovaque était très en retard par rapport à celui de la Bohême et de la Moravie, même s'il était plus étoffé vers Bratislava, Zvolen et dans le Liptov. Selon J. Heteš, il y avait en Slovaquie, en 1947, cinquante-six unités de transformation qui fabriquaient beurre, crème, caséine, fromage blanc (*tvaroh*), fromages affinés ou *bryndza*. Les cartes soulignent alors un relatif sous-équipement des plaines situées à l'ouest d'une ligne Šahy-Trenčín. En revanche, les laiteries sont nombreuses vers Zvolen, dans le Liptov, le Spiš, la plaine orientale, ainsi que vers Prešov et Košice.

Le nouveau régime crée une industrie de transformation d'une tout autre ampleur. Certains sites sont modernisés (Zvolen, Bratislava,...), alors que de nombreuses unités sont créées de toute pièce. En 1990, le pays possède trente-six usines d'une capacité moyenne de cinquante millions de litres (contre 40 en Tchéquie et 18 seulement en France à la même date). En dépit de certaines lacunes (coût écologique, normes sanitaires, faible productivité,...), cet outil industriel est globalement performant dans le cadre du bloc de l'Est.

2 - La réorganisation structurelle des laiteries après la Révolution

Après 1989, de nouvelles mutations s'imposent. Les laiteries sont privatisées selon diverses procédures et de nouvelles entreprises se créent. Elles sont cent quinze dès 1995 mais une profonde restructuration s'opère toutefois rapidement. On ne compte plus que soixante-douze ateliers en 2001 et, s'il fallait quarante laiteries pour assurer 90 % de la collecte en 1995, il n'en faut plus que vingt-trois en 2001 (Carlier, 2001). Le programme européen SAPARD, signé le 17 novembre 2000, parie d'ailleurs sur l'émergence de quatre à six grandes entreprises et de seulement cinq à dix usines spécialisées.

En outre, l'application de la vérité des prix bouleverse les filières. La baisse du pouvoir d'achat réduit sévèrement la demande qui passe de 219,8 litres d'équivalent lait par habitant en 1990 à 165,6 litres en 1993, avant de se stabiliser à un peu moins de 160 litres. Cela conduit très vite les entreprises à réduire le prix d'achat du lait, ce qui ne fait qu'accélérer la baisse de la production. Il faut attendre la fin du siècle pour retrouver un certain équilibre du marché.

3 - L'omniprésence des capitaux étrangers

La révolution de 1989, puis la chute de Mečiar en 1998 stimulent les privatisations et l'arrivée de capitaux étrangers. Certes, la collecte est limitée, les usines exigent une coûteuse mise aux normes et le personnel est souvent en surnombre, mais les atouts ne manquent pas. Le lait slovaque est « *aux normes européennes* » en matière sanitaire, les salaires sont attractifs et l'on est aux portes de l'Europe des quinze, dans un pays facile d'accès, notamment à l'Ouest, et stabilisé politiquement.

Reste le prix du lait. Ici, une interprofession bien structurée détermine, en collaboration avec l'Etat, un prix minimum garanti qui était, en 2000-2001, de 8,53 à 8,85 couronnes par litre, plus une « prime qualité » de 1,10 couronne versée dans la limite d'un « quota spécifié ». Mais la tendance est à la hausse et les enquêtes récentes révèlent des prix de 10 SKK, soit 0,28 euro/litre, comparables aux prix français. Contrairement aux idées reçues, le coût de la matière première ne semble donc pas un facteur décisif de l'implantation des industriels venus d'Autriche, des Pays-Bas, d'Italie, d'Allemagne et surtout de France.

La laiterie centrale de Bratislava, la plus grande du pays, fut reprise, dès 1992, par des Autrichiens qui la revendront à la société allemande Meggle en 2000. Rajo collecte 150,7 millions de litres (2003) auprès de seulement soixante-quinze producteurs, localisés pour l'essentiel dans la plaine du Danube, emploie trois cent quarante-trois salariés et transforme près de 400 000 litres par jour. Cette affaire prospère détient notamment 48 % du marché slovaque du lait UHT et 30 % de celui des yaourts.

Les Italiens ont investi massivement dans la plaine du sud, à Veľký Krtíš, Krupina, Lučenec, Trnava, Nové-Zámky et Hlohovec, avant de se désengager presque tout aussi vite. Le groupe autrichien Misly contrôle les laiteries de Prievidza et de Bánovce. Plusieurs sociétés hollandaises sont également présentes. L'une d'elles fabrique même du... gouda à Strážske, dans l'est du pays.

Les Français ont été les plus actifs. Danone a construit une usine dans la banlieue de Trnava, en 2000. Les fromageries Bel ont acquis 89 % du capital de Zempmilk, une laiterie de Michalovce, dans l'est du pays, spécialisée dans les fromages fondus, ainsi qu'une participation dans la fromagerie de Tvrdosín, en Orava.

Bongrain a réalisé la percée la plus importante, en reprenant par étapes les fromageries de Zvolen (Wittman a Syn, cédée en 2005 à Senoble, un autre groupe français), Nové-Mesto nad Váhom et surtout Liptovský-Mikuláš. Bongrain a acquis cette dernière affaire à partir de mai 2000, intéressé, selon le Directeur, par « *la gamme de produits, la marque « Liptov », la qualité des produits et l'efficacité du management* ». La visite de Liptovská Mliekareň permet d'ailleurs de découvrir une usine certifiée ISO 9002 et parfaitement équipée en matériel français. Elle fabrique nombre de produits dont cinq mille tonnes de fromages : pâtes dures de type emmental ou édám, pâtes filées, fromages fumés et *bryndza*. Bref, l'usine rappelle ce que l'on rencontre en France, si ce n'est que la gamme de produits est plus étendue : beurre, lait UHT, lait acide, crème, yaourts, fromages.

Selon J.-P. Carlier, 40 % du lait était collecté en 2000 par des entreprises occidentales. En 2005, nos interlocuteurs slovaques parlent même de 70 % (dont 160 millions de litres pour Bongrain) ! Bref, les laiteries à capitaux slovaques sont donc très minoritaires, comme Gemerská Mliekareň à Rimavská Sobota (lait en poudre) ou les fromageries de Kežmarok (Spiš), de Červený Kameň, près de Trenčín, ou encore de Zvolenská Slatina. Soulignons que les étrangers ont manifestement privilégié les unités les plus performantes, ayant par exemple des collectes moyennes par producteur très élevées : deux millions de litres chez Rajo, à peine moins à Liptovský-Mikuláš.

4 - *Quels produits pour quels marchés ?*

Les laiteries slovaques fournissent une gamme variée de produits finis, avec beaucoup de lait de consommation (35 % du lait utilisé) et cinquante mille tonnes de fromages qui absorbent 45 % de la collecte. Cette production fromagère a d'ailleurs assez bien résisté aux bouleversements récents, pendant que le beurre et la poudre de lait suivaient le recul de la collecte.

Le pays est, en outre, significativement impliqué dans les échanges internationaux. L'outil industriel, performant, attire, il est vrai, la matière première et les laiteries importent ainsi une centaine de millions de litres de lait. A l'aval, l'exportation représente 25 % des débouchés. On vend surtout des fromages, ainsi que de la poudre de lait et du lait UHT, surtout en Tchéquie, mais également en Pologne et en Hongrie (commerce de voisinage),

ainsi qu'en Allemagne et aux Pays-Bas, en lien avec le rôle des nouveaux investisseurs. Dans le même temps, on trouve désormais dans les hypermarchés toute la gamme des fromages d'Auvergne ou de l'Aveyron ! Au final, la balance commerciale est positive, reflet d'une réelle efficacité des entreprises.

III - LES ENJEUX DES FILIERES CONTEMPORAINES

Ces filières laitières slovaques semblent donc performantes. Toutefois, tout cela doit être désormais appréhendé dans le contexte plus vaste de l'Europe des 27 et de la PAC bruxelloise. A cet égard, trois points particuliers peuvent être abordés, concernant l'évolution du secteur amont, les relations entre les maillons de la filière et la protection du patrimoine fromager.

A - Quel avenir pour les fermes laitières slovaques ?

Qui parcourt la Slovaquie et ses exploitations laitières peine à se faire une opinion tranchée. Le potentiel existe, les troupeaux sont bien sélectionnés, les installations parfois impressionnantes, le personnel d'encadrement semble compétent, et la qualité sanitaire est au rendez-vous. Mais la réalité est plus nuancée. Le rendement par animal reste en retrait et nombre de ces grosses structures sont en déficit. Il faut dire que les blocages structurels sont nombreux. Ces fermes manquent souvent de liquidités et peinent à investir. En outre, la productivité de la main-d'œuvre reste faible (héritage du passé) alors que l'on hésite à licencier compte tenu du niveau de chômage dans les campagnes.

Ces fermes semblent donc en position d'attente, dans une Slovaquie qui dispose, rappelons-le, et de loin, du quota moyen par exploitation le plus élevé d'Europe avec 921 000 kg ! Dans le contexte d'une politique remaniée, marquée par une baisse des prix du lait qui stimulera la sélection des exploitations, le pays possède bien de réels atouts. Reste à exprimer ce potentiel, ce qui passe notamment par une amélioration de la productivité, par animal et par actif.

B - Les relations au sein de la filière

Les liens entre les différents maillons de la filière présentent plusieurs traits caractéristiques par rapport aux réalités occidentales.

- Les relations entre producteurs et transformateurs, notamment, doivent beaucoup à la taille des fermes laitières. A Liptovský-Mikuláš, il suffit de trente-cinq fermes pour fournir soixante millions de litres ! La densité de collecte exprimée en l/km est donc très élevée, même si l'on doit collecter de l'Orava jusqu'au Spiš, en passant par le Turiec et le Liptov. Ce contexte particulier semble remettre en cause la notion très occidentale de bassin de production. Les spécificités locales conduisent en effet les entreprises à sélectionner quelques gros producteurs, éventuellement dispersés, autant qu'à rechercher une forte densité de livreurs. Mais le gigantisme de ces élevages peut aussi fragiliser les laiteries, comme celle de Rimavská Sobota qui perd, en 2002, son plus gros fournisseur : quatre millions de litres passent à la concurrence du jour au lendemain ! (Lompech, 2004).
- Ces filières s'appuient sur une vraie organisation interprofessionnelle. Elle gère, à partir de 2000, un système de maîtrise de l'offre par le biais de « quotas spécifiés » qui permettent d'obtenir, sous conditions, une prime à la qualité versée par l'Etat

et qui produit ses effets : 93 % de la collecte était « aux normes européennes » en 2002. La Slovaquie bénéficie là d'incontestables atouts dans le nouveau contexte des quotas laitiers entrés en vigueur en mai 2004. L'avance est évidente sur la Pologne, sans parler de la Roumanie.

C - Un enjeu majeur : la protection des produits spécifiques

La Slovaquie possède un vrai patrimoine de produits nés d'un savoir-faire traditionnel et associés à une région. Bref, on tend vers la notion de terroir.

- Le tvaroh est une sorte de fromage frais, largement consommé dans le pays – comme en Pologne –, notamment au petit déjeuner.
- Les parenice sont des pâtes filées qui se présentent sous la forme d'un ruban de quelques centimètres de large, enroulé sur lui-même.
- Les korbačiky sont d'autres pâtes filées, longs filaments d'une trentaine de centimètres et de 2 ou 3 mm de diamètre. Elles viennent des pourtours des Tatras, notamment des fermes de l'Orava, où nombre de femmes proposent ces curieux produits au détour d'une route, vers Zázrivá ou Terchová. Mais les industriels n'ont pas hésité à produire des korbačiky – au goût différent, il faut bien l'avouer –, y compris jusque dans l'est du pays !
- La Slovaquie partage avec la Pologne la tradition de l'oštiepok, un fromage fumé de forme ovale, venu des Tatras et de sa périphérie (Podhalé, Orava, Liptov). Fabriqué hier au lait de brebis, il est de plus en plus confectionné au lait de vache ou de mélange et a été largement industrialisé, ce qui ne favorise pas sa qualité.
- La bryndza constitue le cœur du patrimoine fromager slovaque. Elle résulte d'une tradition de fabrication en deux étapes : on produit d'abord une sorte de « pré-fromage », le hrudkový syr, transformé ensuite en byndza dans les salaš, ou encore dans des laiteries artisanales collectant ces « mottes ». Après 1948, ce système traditionnel ne disparut pas totalement et l'on continua à fabriquer, par exemple sur les lopins individuels. Certains kolkhozes se spécialisèrent aussi dans l'élevage ovin laitier et produisirent du hrudkový syr vendu à des laiteries, voire de la bryndza. Au total, le processus d'industrialisation fut très net, à tel point que la bryndza est aujourd'hui très majoritairement fabriquée en laiterie, avec du lait de mélange pasteurisé... et bien différente de jadis.

En dépit de ces évolutions, la *bryndza* reste un fromage de référence, ingrédient de base du *halušky*, le plat national. Elle est confectionnée notamment dans les *bryndzareň* de Liptovský-Mikuláš, Zvolenská Slatina et Červený Kameň. Ces entreprises livrent de la bryndza pasteurisée contenant 50 % de lait de brebis (la norme minimale pour obtenir la dénomination « Slovenská bryndza »). La production traditionnelle, au lait cru de brebis, subit en revanche une forte érosion et n'est plus guère produite qu'à Ružomberok (Lajda) et à Tisovec (Manica) dans deux fromageries restituées aux propriétaires d'avant 1948. Au total, on fabrique quelques deux mille tonnes de *bryndza*, soit moins de 5 % de la production fromagère nationale : l'identitaire l'emporte donc sur l'économie.

En fait, la *bryndza* est le fromage de toutes les Carpates (Ukraine, Roumanie) avec, à la clef, des enjeux liés à la protection du nom. Bratislava mise sur la dénomination « Slovenská bryndza », mais sans réellement se préoccuper des conditions de production

ni de la délimitation d'une aire de fabrication cohérente, aujourd'hui étendue à tout le pays. Les savoir-faire existent bien, toutefois, mais la Slovaquie a du mal à assimiler tous les enjeux liés à la valorisation du terroir. Ici, on est moins sensible à ces notions qu'en France ou en Italie et quarante ans de collectivisation ont laissé des traces, favorisant une alimentation de nature industrielle et une transformation industrielle. La faiblesse du pouvoir d'achat et les difficultés économiques ne favorisent pas non plus la diffusion d'une *bryndza* de qualité... qui, pourtant, existe bien. Ajoutons aussi que l'obsession de la qualité sanitaire pousse les industriels vers la pasteurisation intégrale. Enfin, de manière significative, notons que c'est l'administration qui pilote les dossiers de reconnaissance en AOP que les transformateurs se contentent de suivre... dans le meilleur des cas.

CONCLUSION

Analyser les filières laitières slovaques conduit à se poser l'incontournable question des atouts et des faiblesses. Le constat semble assez clair. D'un côté, un amont fortement restructuré, un lait de qualité et des outils de transformation assez efficaces. De l'autre, une adaptation difficile, avec des exploitations impressionnantes certes, mais peu performantes et des laiteries qui restent en retard dans le concert européen. Au-delà, les spécificités de cette filière sont nombreuses. Nous en privilégierons trois.

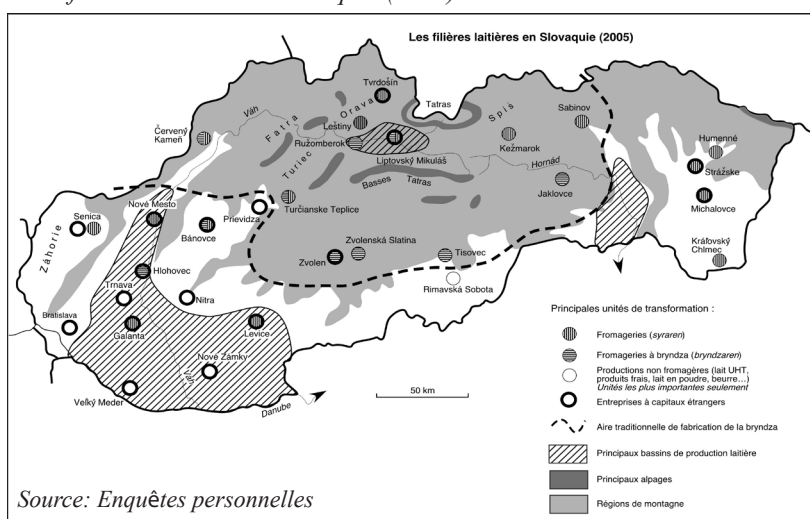
- La première est certainement la concentration de la production dans quelques vastes structures qui rapprochent de l'agriculture industrielle. Il y a là un remarquable potentiel productif, surtout en cas de disparition des quotas laitiers.
- La seconde tient à la notion de bassins de production. A l'ouest, on rationalise la collecte, ce qui favorise la densification du cœur des bassins de collecte, au détriment des périphéries marginalisées. Ici, on peut s'accommoder d'une relative dispersion des livreurs de lait, tout en maîtrisant parfaitement les coûts de collecte.
- L'omniprésence des grands groupes laitiers européens serait la troisième spécificité des filières avec, semble-t-il, des stratégies de développement différentes. Quand la société est française, elle ne peut envisager des transferts de collecte ni fabriquer des produits standardisés réexportés vers une France trop lointaine. C'est bien le marché slovaque qui est privilégié, et l'on fabrique donc des produits destinés à ce pays. La Slovaquie peut aussi servir de base pour conquérir de nouveaux marchés plus à l'est. Quand l'entrepreneur est germanique, il reste proche de sa base nationale et une usine slovaque peut lui servir pour satisfaire le marché local certes, pour lorgner vers les pays situés plus à l'est bien sûr, mais aussi pour confectionner des produits facilement exportés en Autriche toute proche, voire en Allemagne. On assiste donc à une sorte d'extension en tâche d'huile du territoire de l'entreprise. On peut même, à l'occasion, envisager de collecter en Autriche, de transformer vers Bratislava, puis de réexporter vers l'Europe de l'ouest selon un processus de délocalisation qui ne s'accompagne pas de transfert de la production, blocage des quotas oblige.

Acknowledgement: This paper we prepared with the contribution of the grants: VEGA 1/4366/07 a VEGA 1/4028/07

References

- KUBIJOVÝČ, V. (1932): Rozšíření kultur a obyvatelstva v severních karpatech, 146 p.+ statistiques et longs résumés en français, Bratislava.
- ZRINŠČAK, G. (1997): Mutations des campagnes tchèques, Mappemonde, Belin, 256 p. Atlas Republiky Československé, Ed. Orbis, Prague, 1955.
- CARLIER, J. P. (2001): Le secteur laitier slovaque à la veille de son intégration dans l'UE, Rapport de mission pour ATLA, 108 p.
- HETEŠ, J. (1951): Mliečne hospodárstvo na Slovensku, Slovenská akadémia vied a ume- ní, Bratislava, 118 p.
- MINTÁLOVÁ T., (2004): « Tradition et développement contemporain de l'élevage ovin en Slovaquie », dans Les transformations du milieu montagnard Carpates-Massif central, Actes du colloque franco-polonais de Zatwarnica, Prace Geograficzne, Zeszyt 113, Kraków 2004, pp. 207-218.
- LOMPECH, M. (2003): Décollectivisation et politique de développement rural en Slovaquie, Thèse de géographie non publiée, Montpellier, 376 p.
- LOMPECH, M. (2004): « Un bassin de production agricole en transformation : les agro- industries de Rimavská Sobota », dans Dynamiques agro-industrielles et dynamiques rurales, Arras, pp. 65-87.
- LOMPECH, M., RICARD, D. (2007): « Un produit spécifique de la montagne slovaque : la bryndza face à l'intégration européenne », dans Actes du colloque de Vallouise, à paraître, Cahiers de l'ONILAIT, n° 7, juillet 1992, « Pologne, Hongrie, Tchécoslovaquie, La filière laitière », 52 p.
- Atlas krajiny Slovenskej Republiky, Ministerstvo životného prostredia S R, Bratislava, 2002.
- Revue Laitière Française, Caen, voir notamment les n° 617(déc. 2001) et 642 (juin 2004).
- Štatistická Ročenka Slovenskej Republiky, publication statistique annuelle de l'Académie slovaque des sciences, Bratislava.

Fig. 1: Les filières laitières en Slovaquie (2005)



EURÓPSKA TRADÍCIA MLIEČNEHO HOSPODÁRSTVA NA PRÍKLADE SLOVENSKÝCH FARIEM

Zhrnutie

Mliekárstvo všade vo vyspelých krajinách patrí medzi popredné odvetvie národného hospodárstva, lebo má hlbší celospoločenský význam. Každá vyspelá krajina sveta sa snaží o sebestačnosť vo výrobe základných potravín a jednou z tých najdôležitejších je i mlieko a mliečne výrobky. Samotná výroba mlieka a jeho spotreba je dôležitá totiž nielen ako bežná potravinu, ale má veľký celospoločenský význam i z pohľadu existencie chovu dobytka v prvovýrobe, z pohľadu ekonomiky výroby a ďalej z pohľadu zamestnanosti ľudí na vidieku, sociálneho a ekologického programu spracovania produktov celého poľnohospodárstva.

Vývoj trhu s mliekom a mliečnymi výrobkami bol v podmienkach SR za posledných 5 rokov ovplyvnený predovšetkým:

- vstupom zahraničného kapitálu do slovenských mliekarenských spoločností (najmä v rokoch 2001-2003),
- rastom konkurenčného prostredia,
- rozšírením a skvalitnením sortimentu mlieka a mliečnych výrobkov,
- koncentráciou a špecializáciou mliekarenskej výroby,
- zmenou štruktúry výroby,
- zvýšením úrovne marketingu (predovšetkým inovácie, obalová technika),
- zvýšením trvanlivosti výrobkov,
- rastom hygieny a modernizácie výroby,
- zavádzaním systémov kontroly kvality výroby (HACCP, ISO 9001),
- prispôbovaním sa štandardom EÚ,
- rastom exportu na zahraničné trhy.

V mliekarenských spoločnostiach postupne dochádza k ich špecializácii. Mliekarne sa profilujú na tri druhy výroby:

- **výrobu syrov a syrových špecialít** (Liptovská mliekareň, a.s., Zempmilk, a.s., Milsy, a.s., Tvrdošínska mliekareň, a.s., Milex, a.s., Nové Mesto nad Váhom, a.s., Krupinská a Levická mliekareň, a.s., Agrofarma, s.r.o. Červený Kameň)
- **výrobu jogurtov, kyslomliečnych nápojov a tvarohových dezertov** (Rajo, a.s., Mliekospol, a.s., Danone, Milk Agro, s.r.o., Nutricia Dairy s.r.o.)
- **výrobu špecialít a tradičných výrobkov** ako mliečne pomazánky, mliečne desiaty, mliečno – čokoládové keksy, ochutené maslá, špeciálne smotany a tvarohy.

V súčasnom období aj v oblasti mliekarenského priemyslu sa výrazne prejavuje koncentrácia, internacionalizácia a globalizácia prostredníctvom zoskupovania silných podnikateľských subjektov, ktoré prenikajú a pôsobia v medzinárodnom prostredí, čím sa stávajú konkurenciou pre domácich podnikateľov.

Mliekarenský priemysel patrí k najstabilnejším výrobným odvetviam v poľnohospodársko-potravinárskom komplexe.

Ekonomický rast prispieva k zvýšeniu produkcie, čím podniky získavajú vyššie výnosy z predaja svojich výrobkov. Spotrebitelia si môžu vybrať zo širokého sortimentu výrobkov. Pokiaľ napr. jogurty Rajo, Danone, Jogobella, Vitalinea a syry Eidam, Karička, Lunex sa postupne stali jednoznačne "lídrami" na trhu, dnes im začínajú konkurovať iné druhy mliečnych výrobkov. Z lokálnych producentov sa najviac na trhu predávali a konzumovali výrobky z mliekarní Whittmann a syn, s.r.o. Zvolen, Laktis, a.s. Žilina, Mliekospol, a.s. Nové Zámky, PDM Prievidza a Zempmilk, a.s. Michalovce.

Podniky, ktoré nemajú dostatočne využitú spracovateľskú kapacitu, na jednej strane združujú výrobu a na druhej strane strácajú konkurencieschopnosť. Aj napriek tomu, že v roku 1999 bolo na Slovensku 65 spracovateľov surového kravského mlieka je predpoklad, že vedľa veľkých kapitálovo prepojených 4 až 6 mliekarní s kapacitou spracovania 150 - 200 tisíc litrov mlieka, sa uplatní v budúcnosti 5 najviac 10 stredných a malých mliekarní so špecializovanou výrobou.

K najlepším podnikom mliekarenského priemyslu sa vďaka dlhoročnej tradícii vo výrobe syrov, trvalému dosahovaniu vysokej kvality a splneniu medzinárodných hygienických požiadaviek na výrobu zaraďuje akciová spoločnosť Liptovská mliekareň, a.s. Liptovský Mikuláš. Významná časť produkcie akciovej spoločnosti ide sa exportuje. Syry sú známe aj v krajinách najnáročnejších konzumentov v Holandsku, Nemecku, Francúzsku, USA a Českej republike. Mliekospol, a.s. Nové Zámky, ktorá sa úspešne uplatňuje na zahraničnom trhu, realizuje takmer 40 % produkcie bieleho syru Akawi, sušeného odtučneného mlieka a sušeného plnotučného mlieka v Indii, Jemene.

V súčasnosti takmer všetky podnikateľské subjekty, ktoré sa zaoberajú spracovaním mlieka musia pružne reagovať na zmeny medzinárodného prostredia, pretože väčšia časť z nich sa usiluje o svoje presadenie sa na medzinárodných trhoch prostredníctvom svojich produktov.

V podmienkach rastúcej globalizácie svetovej ekonomiky a zosilňujúceho sa zápasu o trhy by malo byť štátnym záujmom Slovenska udržanie produkčne výkonného poľnohospodársko-potravinárskeho komplexu.

Notes

L'ouvrage de J. Heteš, publié en 1951 à Bratislava, est d'une grande importance, car il nous offre une description très précise de l'élevage slovaque et de la transformation laitière, juste avant les bouleversements de la période communiste. Nos remerciements vont à Simona Pračková pour la traduction de ce gros document.

Recenzovali: Prof. h.c. prof. Ing. Ondrej Hronec, DrSc.

Doc. MVDr. Eva Dudríková, PhD.

POINT METHOD FOR THE ASSESSMENT OF REGIONAL DEVELOPMENT – POSSIBILITIES AND PRACTICAL APPLICATION

Juraj TEJ¹

Abstract: *The article presents the method and its use for measuring regional development, that reflects the true status quo based on the identifiable quantities that can be used in assessment. Relatively simple method is an indirect method of measuring regional development - point method based on the maximum, that when used with an adequate number of indices provides the relatively objective and broad view in the possibilities of economic development compared to other municipalities or administration units.*

Key words: *competitiveness, measurement of regional development, region, regional development, town potential.*

INTRODUCTION

The characteristic sign of contemporary Slovak regions is a marked and constantly deepening spatial differentiation in their socio-economic level. Balancing the differences among the regions is one of the basic aims and principles of the regional policy of the EU member states. To evaluate the real state and the objectivity of lagging behind it is necessary to use the exact determination of the socio-economy level of the region and its economy development in comparison to other regions. The objective regional policy should direct individual regions to improve their prosperity and effectiveness completely using the local potential and to remove problems that impede their development. The similar situation is in a different potential of individual towns and municipalities, in their objective facilities by the growth or developmental factors that are present at their territory.

Similarly, as a region cannot be only perceived as a part of the national economy but also as an individual economy basis, town cannot be only understood as an inseparable part of the region. Towns are individual territorial-administration micro-units that influence their development by their policy and using the tools determined for those purposes. The center of the economy vitality lies in demographic structure, economy basis structure, in natural resources, transport possibilities, in social infrastructure, but especially in an ability to use these presumptions and to influence them to an appropriate degree.

The problem of the economy development in the field of functioning and operating of the self-government is relatively new. A town as a basic unit becomes a subject matter of various analysis and its managing is becoming more complex and complicated. Management to a large degree is based on the erudition of the main town-representatives and self-government officials. Their task is to professionally and effectively approach to solving the basic problems that arise at the town territory, to flexibly react to the changes and also to be responsible for creating the strategic developmental plans. Town

¹ *Ing. Juraj Tej, PhD.,*

The University of Prešov in Prešov, Faculty of Management, Department of Public Administration, 17. novembra 1, 080 01 Prešov, tej@unipo.sk

management is thus not a matter of a small group but a matter of professionals of broader range of branches.

MATERIAL AND METHOD

To evaluate the socio-economy level of the development we used the commonly accessible data of the Statistics office and the statistics at the level of three towns—Liptovský Mikuláš, Poprad and Spišská Nová Ves, in the time horizon of 2002 – 2004, in the horizon from which we had the most complex and homogeneous data. We also presumed that in such a short horizon there are no radical changes in the towns' potential. The acquired data were divided into several levels and we applied the point method of measuring the regional development according to the maximum. The results of individual levels' evaluation were summarized in the final table. The evaluation presents the particular view at the towns that were compared. This kind of methodological application has not been published in the scientific literature yet. However, the reaction of the administration practice to such acquired data has been positive.

Each of the assessed indices in a sample has been assigned a certain number of points sorted by their values (compared to the maximum value within a sample of the same hierarchic matrix structure (100 – the best, highest rank to 0 – the worst position, lowest rank), the data are then added and present the basis for setting the order of the regions in particular group of indices in the file of the compared towns.

MEASURING REGIONAL DEVELOPMENT

Regional development is a complex and complicated process that is influenced by many factors and conditions. The basic problem is thus the objectivity of measuring these processes. The indexes that can be used for measuring the development in region should reflect the dynamic processes that are changing in time in different regions. Each region presents a certain type of organism and it is necessary to adjust the indexes for its assessment. Local economy presents the economy subsystem that is spatially limited by the borders of the of the self-government territories that this subsystem is a part of larger national economy systems. The term local economy can be understood as the economy system at the lower level of the territorial-administration units (Čapková 2004, pp. 9 - 10).

Generally, it can be stated that indexes for measuring a regional development should reflect the following criteria (Hamalová a kol. 1996, p. 106):

- indexes should reflect changes in a level of the economy development,
- are statistically determinable, i.e. statistics can find them,
- set of statistics should be optimal from the point of their usability in analyses.

A selection of indexes can be narrowed as some indexes are in the functional relations with another ones (e.g. level of urbanization versus ration of population working in agriculture...).

The methods that are used to compare the level of development of regions can be divided into two groups – direct and indirect methods (Belajová, Fáziková 2002, p. 113). Direct methods are the ones that are usually used in the cases when the statistics observes some of the synthetic level indexes that are used as an indicator of measuring

the economy level of regions (Kravčáková 2005, p. 34; Fuchsová 2005, p. 69). Currently there is a problem with finding such indexes at the level of towns or municipalities and thus it is suitable to use indirect methods. Using the methods of measuring the regional development is not very frequent, and it is even less frequently used in measuring the potential of urbanization of the socio-economy systems of the towns.

COMPARATIVE ANALYSIS

To apply the comparative analysis of the economy development of the town we used the point method we compared the following towns Liptovský Mikuláš (LM), Poprad (PP) and Spišská Nová Ves (SN). Before applying the selected method to compare the above mentioned towns we bring the short description and characteristics.

Considering the area - Liptovský Mikuláš is the largest town. It is spread on the area of 69,67 ha with the population of 33 004. The second position as to the area belongs to Spišská Nová Ves. Its area is approximately 3 ha (66,67) smaller. The population is slightly bigger than in LM (38 785). Poprad is the smallest one out of the three selected towns with its 63,05 ha, however the population is the biggest here - 55 680. All three towns can be considered to be the centers the traveling (LM – Liptovská Mara, Západné and Nízke Tatry, Chočské vrchy, PP – Vysoké and Belianske Tatry, Levočské pohorie, uplands of Kozie chrbty and Štrba water parting, SN – Levočské vrchy, Spišsko-gemerské rudohorie, part of Gotická cesta). Industry is present in all towns and is mostly based on traditions.

Demographic aspect

To assess the development of the town and its further development in the field of demography it is necessary to evaluate not only population growth but also its mechanic migration caused by population moving from and to different towns. Another demographic information that is interesting and that was applied was the educational and age structure of the population. Natural and mechanical migration of population is calculated per number of inhabitants in particular cities and particular years. Age and educational structure is expressed by the proportional share from the total population and thus it is not necessary to recalculate these indexes.

Tab. 1: Comparison of the towns: Demography 1

	PN/PM			MIC/MDC			Pre			Prod			Popr		
Year	LM	PP	SN	LM	PP	SN	LM	PP	SN	LM	PP	SN	LM	PP	SN
1999	2,87	4,59	3,10	-2,13	-5,23	-3,62	20,00	21,87	28,73	64,62	66,15	59,42	15,38	11,98	11,96
2000	0,44	4,27	2,30	-2,54	-3,19	-0,28	17,95	20,79	24,61	62,63	66,88	62,04	19,42	12,33	13,48
2001	0,67	4,34	1,07	0,03	-3,77	-3,12	17,37	19,63	23,30	63,27	67,45	61,70	19,36	12,92	14,60
2002	1,15	3,25	1,80	-0,85	-7,82	-6,01	16,74	18,68	22,68	63,60	67,82	62,57	19,67	13,50	14,75
2003	0,88	2,30	2,60	-2,03	-7,69	-7,06	15,97	17,67	22,54	66,64	68,19	62,43	17,38	14,14	14,82

Legend: PN/PM – population natality, resp. mortality per 1 000 inhab., MIC/MDC – increase, resp. decrease by migration per 1 000 inhab., Pre – pre productive age in % /0–14 r./, Prod – productive age in % /15–59 males, 15–54 females/, Popr – post productive age in % /60+ males, 55+ females/

Considering the population structure one can see that the low increases and low migration in LM are given by high number of the population in the post-productive age. It is also confirmed in the low share of the people in the pre-productive age. These constituents also have the most negative values out of the selected towns and indexes. Poprad and Spišská Nová Ves can be considered to be more progressive towns. The share of Roma community is a phenomenon in SN that positively influences especially the indexes that reflect population natality.

Tab. 2: *Comparison of the towns: Demography 2*

Category	educational structure v %			points		
	LM	PP	SN	LM	PP	SN
Elementary education	15,04	14,50	15,14	99	96	100
Secondary education without CCSE	22,57	20,90	22,02	100	93	98
Secondary education with CCSE	29,50	30,34	30,42	97	100	100
University education	11,96	9,96	9,33	100	83	78

Source: Regional administrations of the Statistics offices of the SR in Prešov, Košice and Žilina and author's calculations

The educational structure of population markedly influences the developmental potential of town. Based on the calculated data the most educated town is Liptovský Mikuláš. The highest number of points reached the population with the University education and secondary education without GCSE. As to Spišská Nová Ves, here prevails the population with the elementary education and with secondary education with GCSE. Between these two towns is Poprad with the only first position, in the category of population with secondary education with GCSE.

Tab. 3: *Point analyses of the towns: Demography*

Year	PN/PM			IC/DC			Pre			Prod			Popr		
	LM	PP	SN	LM	PP	SN	LM	PP	SN	LM	PP	SN	LM	PP	SN
1999	63	100	68	100	40	59	70	76	100	98	100	90	78	100	100
2000	10	100	54	11	9	100	73	84	100	94	100	92	63	100	91
2001	16	100	25	100	1	1	75	84	100	94	100	91	67	100	88
2002	36	100	56	100	11	14	74	82	100	94	100	92	69	100	92
2003	34	87	100	100	26	29	71	78	100	98	100	92	81	100	95
Total	159	487	303	411	87	203	363	404	500	478	500	457	358	500	466

Source: author

Tab. 4: *Total summary of the reached points: Demography*

Index	Liptovský Mikuláš	Poprad	Spišská Nová Ves
Nativity, resp. mortality	159	487	303
MIC/MDC	411	87	203
Pre-productive age	363	404	500
Productive age	478	500	457
Post-productive age	358	500	466
Elementary school education	99	96	100
Secondary school education without GCSE	100	93	98
Secondary school education with GCSE	97	100	100
University education	100	83	78
Total points number	2165	2350	2305

Source: author

Based on the calculations each index was assigned the points. The maximum value that could be reached was 2 900 by one town. Reading the table it is clear that the most perspective town is Poprad, that reached the highest number of points in the total of the observed values (2 350), especially thanks to the development in the field of natural population migration, appropriate age structure of population. On the second position is Spišská Nová Ves (2 305 points), with the positive demographic characteristics especially in the field of pre-productive category of population and the education structure - secondary school. The advantage of Liptovský Mikuláš (2 165 points) is especially the situation in the field of mechanical migration, University education and the population in the productive age.

Based on the previous analysis the problem areas of the studied towns can be evaluated. Considering Poprad it is especially the decrease of population caused by migration and the low number of people with University degree. Liptovský Mikuláš lags behind in the population structure; Spišská Nová Ves has the problems in the field of University education and the population decrease caused by emigration.

Economy

One of the areas that influence the development of town to a large extent is especially its economy structure and performance, efficiency. This is why we selected such set of indexes to evaluate the potential of town that characterizes the economy potential of town. Here can be classified the structure of economy subjects, revenues reached in industry, building industry and in the internal trade. The only negative index is the level of unemployment. This means that the maximum number of points is assigned to the lowest value.

Tab. 5: *Comparison of the towns: Economy*

Year	2001			2002			2003		
Category per 1 000 inhabit.	PP	LM	SN	PP	LM	SN	PP	LM	SN
Industry in mil. Sk									
Income for capacity and goods	283,97	167,24	232,09	253,17	204,89	227,86	276,98	157,95	226,09
Income for sales for export	163,49	122,11	128,24	128,86	94,53	126,03	149,87	103,78	137,76
Building industry in mil. Sk									
Produkcia cez dod. zmluvy	22,74	23,57	14,24	19,06	24,40	16,58	23,78	27,78	18,54
Production by own workers	18,63	17,74	10,71	14,93	18,85	11,53	20,22	21,15	14,23
Internal trade in mil. Sk									
Income for capacity and goods	76,07	134,54	62,73	110,39	128,42	54,49	117,62	164,50	53,06
Juridical body	33,25	34,64	36,53	32,51	36,95	30,37	35,76	39,48	32,46
Physical person	104,35	129,69	97,90	103,02	127,20	99,39	114,71	137,29	112,88
Unemployment rate in %	20,66	15,88	25,79	19,67	15,53	24,35	17,86	16,48	21,98

Source: Regional administrations of the Statistics offices of the SR in Prešov, Košice and Žilina and author's calculations

Poprad seems to be the most advanced town as to the industry. It reaches the highest revenue for realization of own performance and goods as well as the sale for export. This situation is also given by the long-term existence of the industrial production in town. In building industry as well as in the incomes from the internal trade Liptovský Mikuláš seems to be the most perspective in all studied indexes. Similarly, there is the highest number of entrepreneurs in this town – juridical bodies and physical persons. As to the last index, i.e. unemployment rate, LM is at one of the leading position, i.e. the unemployment rate is the lowest in this town during the period of the studied years. It means, that based on the above mentioned indexes we can state that the economy potential of Liptovský Mikuláš is the highest from among the three analyzed towns. The maximum number of the points that can be achieved is 2 400.

Tab. 6: *Point analysis of towns: Economy*

Year	2001			2002			2003			Spolu		
Category	PP	LM	SN	PP	LM	SN	PP	LM	SN	PP	LM	SN
Industry												
Revenue for performance and goods	100	9	82	100	81	90	100	57	82	300	147	254
Revenues for sales for export	100	75	78	100	73	98	100	69	92	300	217	268
Building industry												
Building production performed based on the contracts	96	100	60	78	100	68	86	100	67	260	300	195
Building production performed by the own employees	100	95	57	79	100	61	96	100	67	275	295	185
Internal trade												
Revenues for own performance and goods	57	100	47	86	100	61	72	100	32	215	300	140
Juridical body	91	95	100	88	100	82	91	100	82	270	295	264
Physical person	0	100	75	81	100	78	84	100	82	165	300	235
Unemployment rate	77	100	62	79	100	64	92	100	75	248	300	201

Tab. 7: *Total summary of the achieved points: Economy*

Revenues for sales for export	217	300	268
Building industry			
Building production performed based on the contracts	300	260	195
Building production performed by the own employees	295	275	185
Internal trade			
Revenues for own performance and goods	300	215	140
Juridical bodies	295	270	264
Physical persons	300	165	235
Registered unemployed	292	290	182
Total number of achieved points	2146	2075	1723

Source: author

Based on the tables above we can confirm that Liptovský Mikuláš can be considered to be the economically most advanced town. It took this position thanks to the excellent results achieved in the field of building industry, in number of entrepreneurial subjects and low rate of unemployment. Poprad lags behind LM only in 71 points, and it reaches high volumes in industrial production and also in building production. In comparison to LM and PP - Spišská Nová Ves does not reach a marked economy performance but its industrial production has been continuously growing. Among the negative factors that influence the development of this town belong high unemployment, low building production and incomes in internal trade.

ANALYSES SUMMARY

Based on the point analyses we can compare the towns in two selected areas. The maximum number of points that could be reached by individual towns was 5 300.

Tab. 8: *Number of points achieved in the selected towns*

	Town		
	PP	LM	SN
Demography	2 350	2 165	2 305
Economy	2 075	2 146	1 723
Total	4 425	4 311	4 028

Source: author

Poprad was the town with the number of achieved points that was closest to the maximum and as the town with the best socio-economy potential it took the best position. Liptovský Mikuláš achieved just 114 points less. The last position belongs to Spišská Nová Ves that lags behind Poprad in 397 points. Considering Liptovský Mikuláš, economy indexes seem to be the biggest strength of the town. Incorporating other indexes as e.g. traveling, transport infrastructure, social infrastructure and/or others, the differences among the town would be even more crystallized and the total view to comparative analyses would be more plastic.

CONCLUSION

Application of the point method of measuring the development of towns according to the maximum of their developmental potential showed its possible use with relatively high validity depending on the used structure of indexes. The importance of using the indirect methods of the economy development lies in simplicity of its application and in using such structure of indexes that can be currently obtained at the level of towns. At the same time the completed process of the competencies transformation to the municipalities and completion of the tax reform that markedly contributes to the extension of their income basis – gives a presumption for the desirable future economy development for using and activation of all practically identifiable factors of the town development with the active help of the regional policy with the tools that can be markedly objectivized by applying the methods of measuring the development of towns and municipalities. It is especially a high validity of the method, simple application and data obtainability, ability to compare individual towns, knowing own „value“ of the town in region, possibility to find the comparative advantages of town and position, as well as the use for the needs of regional policy.

Using objective methods enables towns to learn about their topical, current „value“ in a region and thus to contribute to the correct subconsciousness, that leads toward higher level of the local identity of inhabitants in the social area and to an increase of the competitiveness of towns and municipalities in the economy area.

Acknowledgement: The study was written as one of the grant VEGA No. 1/3829/06 outputs.

References

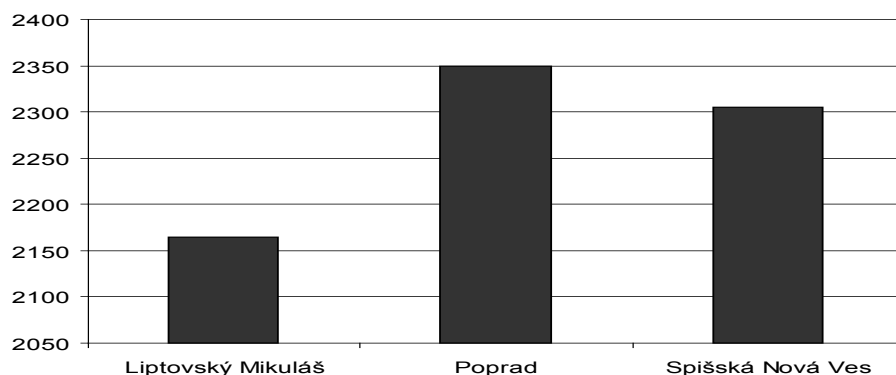
- BALÁŽOVÁ, E., PAPCUNOVÁ, V. (2006): Vplyv fiškálnej decentralizácie na rozpočtové hospodárenie obcí v SR. In IX. Mezinárodní kolokvium o regionálných viedach. Brno: Masarykova univerzita ESF KREaS v Brne, 2006. s. 163, ISBN 80-210-4155-2
- BELAJOVÁ, A., FÁZIKOVÁ, M. (2002): Regionálna ekonomika. Nitra: SPU, 2002. 191 s. ISBN 80-8069-007-3.
- ČAPKOVÁ, S. (2004): Rozvoj miestnej ekonomiky. Banská Bystrica: EF UMB, 2004, 95 s. ISBN 80-8055-994-5
- FUCHSOVÁ, K. (2005): Inovačný potenciál a migrácia z pohľadu redukcie regionálnych disparít. In: Analytický pohľad na základné súvislosti a výzvy regionálneho rozvoja v slovenských podmienkach [elektronický zdroj]: Štefko, R. (ed). Prešov: Prešovská univerzita, 2005. ISBN 80-8060-390-5, s. 69- 77
<http://www.pulib.sk/elpub/FM/Stefko1/index.htm>
- HAMALOVÁ, M. a kol. (1996): Priestorová ekonomika. Bratislava: Ekonóm, 1996. 144 s. ISBN 80-225-0750-4.
- KUZMIŠIN, P., KUZMIŠINOVÁ, V. (2006): Regionálna konkurencieschopnosť v podmienkach Prešovského samosprávneho kraja. In IX. Mezinárodní kolokvium o regionálných viedach. Brno: Masarykova univerzita ESF KREaS v Brne, 2006. s. 7, ISBN 80-210-4155-2
- KRAVČÁKOVÁ, G. (2005): Aplikácia vybraných teórií regionálneho rozvoja v Prešovskom kraji. In: Analytický pohľad na základné súvislosti a výzvy regionálneho rozvoja

v slovenských podmienkach [elektronický zdroj]: Štefko, R. (ed). Prešov: Prešovská univerzita, 2005. ISBN 80-8060-390-5, s. 34–43,
<http://www.pulib.sk/elpub/FM/Stefko1/index.htm>

TEJ, J. (2006): Praktické využitie bodovej metódy hodnotenia regionálneho rozvoja. In: Acta Facultatis Humanitatis et Naturae, Folia Geografica 10, Prírodné vedy. Prešov: FHPV PU, r. XLV, 2006. s. 521, ISSN 1336-6149

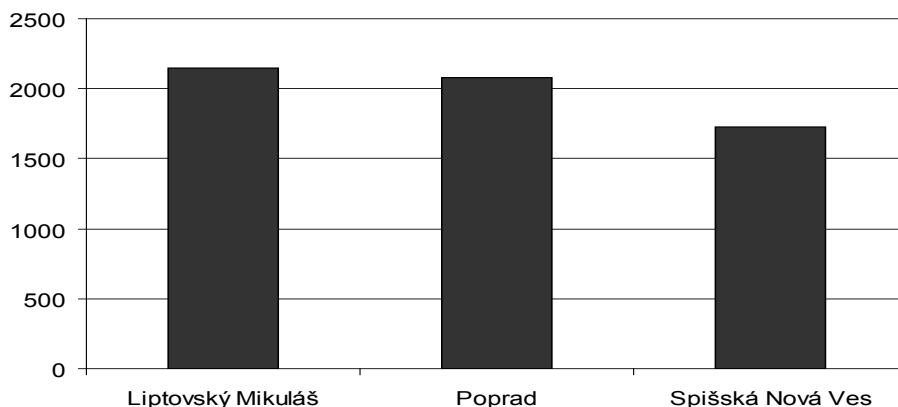
ŽIŠKA, D. (2005): Komparatívna analýza hospodárskeho rozvoja mesta Poprad v porovnaní s jeho konkurentmi v regióne. Diplomová práca vypracovaná na Katedre verejnej správy Fakulty manažmentu, Prešovská univerzita v Prešove, pod vedením Mgr. Ľ. Budziňáka.

Graph 1: *Demography totals*

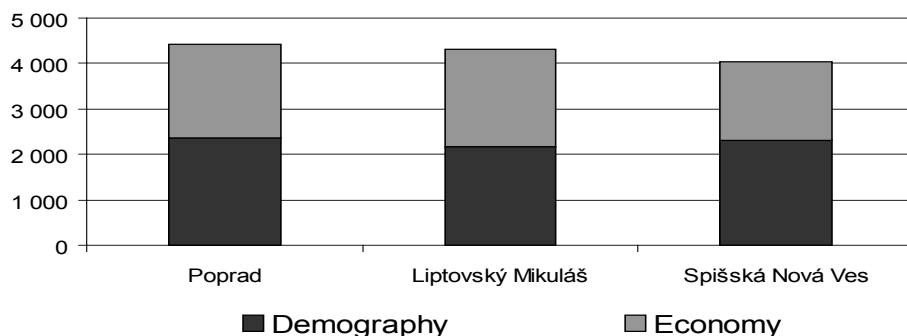


Source: author

Graph 2: *Economy totals*



Source: author

Graph 3: Total ranking

Source: author

BODOVÁ METÓDA HODNOTENIA REGIONÁLNEHO ROZVOJA – MOŽNOSTI A PRAKTICKÁ APLIKÁCIA

Zhrnutie

Práca sa zaoberá použitím nepriamej metódy merania regionálneho rozvoja a možnosťami jej využitia v praxi, pretože odráža skutočný status quo založený na identifikovateľných veličinách, ktoré sa v hodnotení využívajú, pretože sú dostupné. Ide o jednoduchú metódu bodovú metódu podľa maxima, ktorá pri použití adekvátneho počtu ukazovateľov poskytuje relatívne objektívny a široký pohľad na možnosti ekonomického rozvoja v porovnaní s inými obcami či administratívnymi celkami.

Pre vyššiu transparentnosť sme použili iba dve skupiny údajov – oblasť ukazovateľov týkajúcich sa demografickej charakteristiky a oblasť týkajúcu sa hospodárstva. Metódu hodnotenia sme aplikovali v troch okresných sídlach – v Poprade, Spišskej Novej Vsi a Liptovskom Mikuláši. Výhoda použitia nepriamej metódy merania regionálneho rozvoja spočíva v tom, že ide o ukazovatele, ktoré nepodliehajú rýchlym zmenám a preto má výsledok analýzy časovo širšiu platnosť, zároveň prakticky neexistuje obmedzenie počtu ukazovateľov, ktoré je možné do analýzy zaradiť.

Použitie objektívnych metód umožní mestám poznať aj svoju aktuálnu „hodnotu“ v regióne a tak prispieť aj k správne mu povedomiu, ktoré vedie v sociálnej oblasti k vyššej úrovni lokálnej identity obyvateľov a v oblasti ekonomickej k zvyšovaniu konkurencieschopnosti miest a obcí.

Recenzovali: Prof. RNDr. René Matlovič, PhD.
Prof. RNDr. Robert Ištók, PhD.

PROFITABILITY POTENTIAL OF THE CROP PRODUCTION IN SLOVAK REGIONS

*Jozef VILČEK*¹

Abstract: This report states particular potential rates of solids production and profitability of the production for the most occurring soil types, categories of steepness, skeletalness, soil depth and granularity. The calculation confirms the high correlation of profitability and natural yield of the crop production. Sustainable positive profitability in the crop production is expectable only in the regions with Mollic Fluvisols, Chernozems, Haplic Luvisols, Fluvisols, Albic Luvisols and Planosols contribution. The other regions depend on the subsidiary economic impulses. The analysis of the chosen soil parameters has generally shown that under recent economic conditions is the crop production without subsidiary impulse profitable only in lowlands and slopes to 7°, in deep soils, without skeleton, as to granularity medium heavy soils. This finding does not have to refer to a particular crop. Heterogeneity of the Slovak soils and their characteristics implicitly brings different productive and economic potentials of individual regions. Positive potential of the profitability rate of the crop production can be expected in Bratislava, Trnava, Nitra and Trenčín municipality. According to the classification of the regions into the agricultural productive areas profitability potential is positive only in maize and beet production region. According to the dividing of the Slovak territory into so called LFA (less favoured areas) profitable regions are not included into this system, or the regions with specific disadvantages as well. This report analyses in detail both the text and the graphic form above mentioned differences in potentials of producing the biomass as well as profitability of its production regarding the soil characteristics and agricultural relevant regions.

Key words: profitability of the crop production, solids biomass production, soils parameters, Slovak regions

INTRODUCTION

Economic and social development of any territory is closely associated with the utilization of its natural and human resources. The degree of successfulness of the individual regions depends on their management abilities to utilize effectively existing potentials on the behalf of the country and its inhabitants.

Agricultural landscape is one of the mostly extended natural potential of the country in Slovakia. The method of its utilization concerns almost the half of the republic area. Different agrarian activities which directly or indirectly influence the environment and are also able to bear immediate economic effect are enacted on this acreage. On the other hand, improperly selected structure of the agricultural landscape utilization can negatively influence ecological stability and economic standard of the region. Regarding the dislocation of the agrarian activities it is inevitable to know the potential of the country

¹ **Prof. Ing. Jozef Vilček, PhD.,**

Department of Geography and Regional Development, Faculty of Humanities and Natural Sciences, University of Prešov in Prešov, e-mail: vilcek@vupop.sk

and its individual components, among which the soil is dominant. Soils characteristics and parameters can significantly differentiate the character of the country structure and its utilization. From that point of view, this report, analysing dominant soil characteristics, is dealing with potential effectivity of the crop production in Slovak regions.

MATERIAL AND METHODS

The problem solution results from the soil investigation research observations and the informative system on the soils of Slovakia. This informative system represents the rich initial database of their characteristics, areal differentiation, utilization and protection as well. The following methods and information were specifically used:

- site qualification bank on soils of Slovakia (Soil science and conservation research institute Bratislava),
- updated collection of the BSEU – bonited soil-ecological units (M 1:5000) maps in digital form (GIS ARC INFO), and following information databases (SSCRI Bratislava),
- areal and soil-ecological regionalization of agricultural landscape of Slovakia into so called less favoured areas (Less favoured areas - LFA) (Research Institute of Agricultural and Food Economics, Bratislava),
- potential economic parameters of the soil units (Vilček, 1999) a.o.

Production of the biomass expressed in the solids was defined for each BSEU on the basis of the potential yields of the agricultural crops namely of the main crop yield as well as the minor products and the root remainders. The crop representation resulted from so called typological structure of the agricultural crops seeding in 2000-2004. The rates of potential biomass production were assigned to the particular BSEU and they were decoded into the individual categories of evaluating parameters in GIS background and thus it was possible to differentiate and specify coefficients selected by us.

Similar approach was used to characterize the profitability rate. It was defined as a share of potential profit and costs of crop growing on the level of BSEU.

The methods of operating analyses, data collection in the landscape (particularly spotted localities) and inquiry (agricultural establishments), the soil sampling methods, methods of processing and evaluation of the soil samples, statistic correlation methods (polynomial regression relativities), mathematical simulation of the relations as well as the current software programmes (in particular geographic informative systems – GIS) and their applications were used while the partial problems solving.

Evaluating of the pedogeographic soil characteristics (climate, steepness, depth, skeletalness, granularity, etc.), from their productive and economic possibilities point of view, was based on heretofore elaborated databases on supposed natural and economic parameters of BSEU (Vilček, 2005), which were thoroughly updated and modified during the process of evaluation to receive the recent level. Predominantly, these are economic parameters (prices, costs etc.) which are subjected to the time changes and thus the original databases from 1990-1998 were innovated by the growth index.

By this method objective informative databases on soil units in all Slovakia were originated and these are possible to apply in any region where are data on bonited soil –ecological units known.

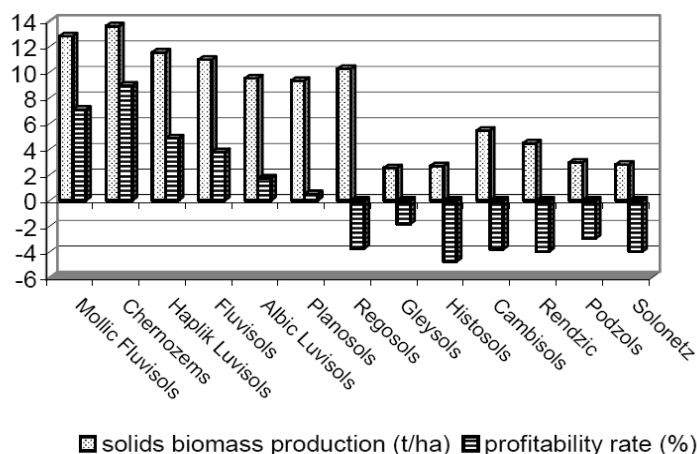
RESULTS AND DISCUSSION

Economic effectivity of the crop production makes a very important role in forming of the landscape structure, its utilization and further development. From this point of view, predominantly, in the heterogeneous natural conditions of Slovakia, the important role is maintained by the environmental quality, in particular the soil quality. The existing soil conditions significantly limit, differentiate and predestinate individual regions for specific patterns (forms) of farming. Diametrically different structures of the crop production are applied in the lowland regions, submountains or mountains areas. There are different structures in quality soils and the different ones in the poor quality soils. Structure heterogeneity of the soil utilization is reflected in the economy of the crop production. In particular, it is intensively perceived by the producers of unsuitably selected crop commodities. In this case, if there is an incompatibility of the environment and the crop needs, financial lost and thus incorrectly invested capital cost is occurred. The profitability of the crop production represents an indicator of the country and regions suitability for the crop production.

The soil parameters influence on the crop production profitability

The effectivity and profitability of the crop production predominantly depends on the soil characteristics. There are significant differences obvious in the classification of the soil types concerning the potential production of the biomass among the following soil types Mollic Fluvisols, Chernozems, Haplic Luvisols, Fluvisols, Albic Luvisols, Planosols and Regosols and soil types Gleysols, Histosols, Cambisols, Rendzic, Podzols a Solonetz (Figure 1). The similar situation except Regosols is observed also in the potentials of the crop production profitability. According to our calculation the crop production in the soil types Regosols, Gleysols, Histosols, Cambisols, Rendzic, Podzols and Solonetz is not profitable without subsidiary economic impulses.

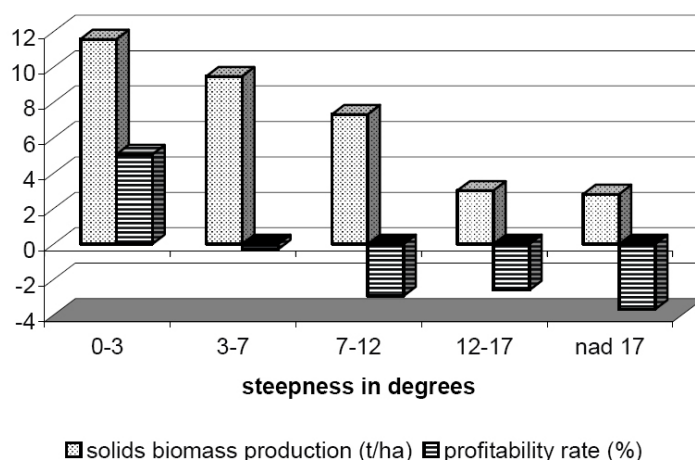
Fig. 1: *Potential profitability of the crop production and the biomass production according to the soil types*



Source: author

Productive and economic potential of the crop production depends on the landscape configuration as well. This is predominantly steepness and connected obstructed production conditions which directly influence the effectivity of the crop growing. The most of the agricultural landscape is situated in the lowlands (44.3 %), and medium hills (19.9 %). The soils in the lowlands show four times higher fertility potential in comparison to hilly soils above 12°. Admittedly significant information is the negative prediction of the crop production profitability in the soils situated in the hills above 7° (Figure 2).

Fig. 2: Profitability of the crop production and the biomass production according to the soil steepness the soil types

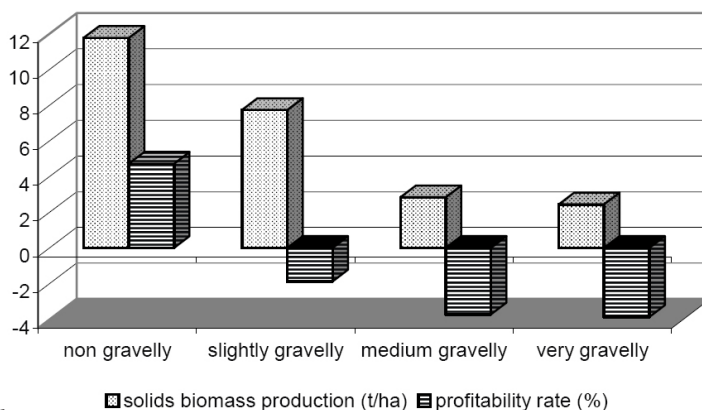


Source: author

As well as the steepness also the skeleton contents in the soils and their depth influence the production of the grown crops biomass. There are 52.8 % soils without skeleton,

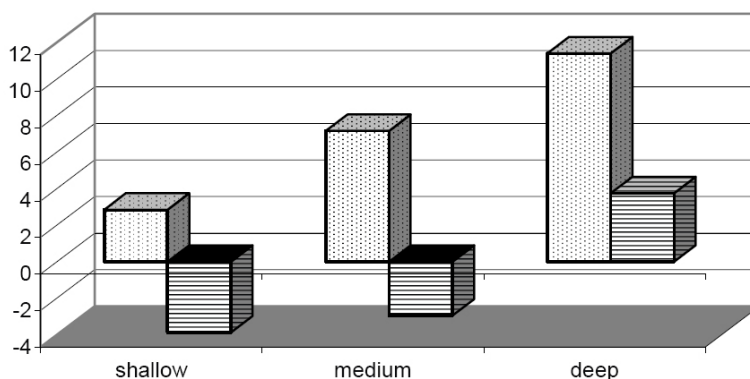
16.1 % slightly skeletal, 8.7 % medium skeletal and almost 22.4 % heavy skeletal. 62.0 % present deep soils, 15.6 % medium deep and 22.4 % shallow soils in Slovakia. There is an assumption that the phytomass production which is produced in heavy skeletal soils can reach only 21 % of the amount produced in the soils without the skeleton. In the shallow soils it presents 25 % of the amount produced in the deep soils. Regarding the financial point of view the slight skeletal and the medium deep soils are not profitable for the classic crop production (Figure 3 and 4).

Fig. 3: *Potential profitability of the crop production and the biomass production according to the soil skeletality*



Source: author

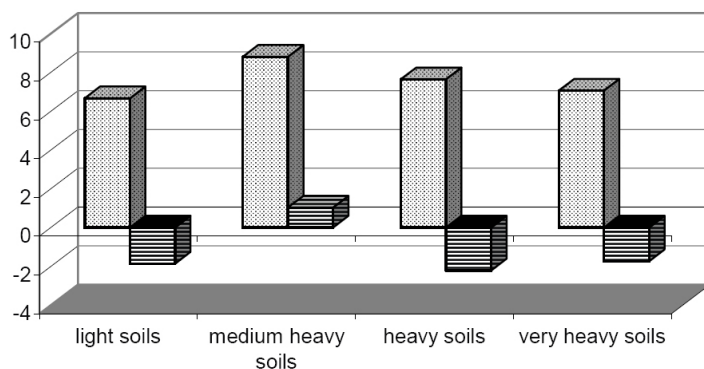
Fig. 4: *Potential profitability of the crop production and the biomass production according to the soil depth*



Source: author

Production parameters of the soils are closely associated with their texture (granularity composition). There are 6.4 % light agricultural landscape as to granularity, 73.1 % medium heavy, 17.1 % heavy and 3.3 % very heavy. There is an assumption that the production of the phytomass can be decreased in 25 % in light soils and very heavy soils in comparison to medium heavy soils. This fact is reflected in the economy of the crop production. The profitability potential without the subsidiary impulses is positive only in medium heavy soils. The crop production in light and heavy soils is not profitable in Slovakia at current economic parameters. The lower loss of very heavy soils opposite the heavy soils and light ones is a result of lower costs related to use of these soils predominantly as permanent grasslands.

Fig. 5: *Potential profitability of the crop production and the biomass production according to the soil granularity*



Source: author ■ solids biomass production (t/ha) ■ profitability rate (%)

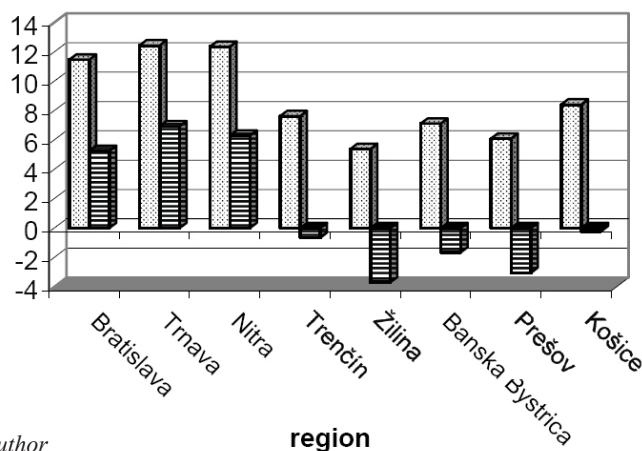
Above mentioned pedological aspects in mutual interactivity with climate as well as with another natural and human influences differentiate the agricultural landscape from economic effectiveness of the crop production point of view. This fact significantly affects developing possibilities of individual regions. It is impossible for the regional policy to do without the knowledge of productive and economic potential of the agricultural landscape. From this aspect it is suitable to analyse and know productive and economic potential of the agricultural landscape according to the classification into the traditional regions. This knowledge can significantly influence the direction of the regional developing policy.

Profitability of the crop production according to the regional-administrative division

The regional-administrative division of Slovakia represents basic, generally comprehensible categorisations of the territory, in which the weather condition is taken into consideration only a little. In spite of this the analysis of the potential effectiveness of the crop production according to the districts or regions is a significant indicator mostly for efficient areal distribution of individual activities or for designing of the state subsidiary policy in the agricultural department. Our calculations have confirmed that only regions with the soils of the highest point value – Trenčín (70 points), Nitra (69 points) and Bratislava (62 points) are able to profit from the crop production, too (Figure 6). The level of the produced phytomass per one hectare range on the level of about 11-12 t of solids. The less profitable, as to this indicator concerns, are regions of Žilina and Prešov with the soil of the point value 26 or 27 points, where only 6 – 7t of phytomass solids are produced by one hectare, that is only one half if compared to the most productive regions in Slovakia.

A new question is arising from this analysis, what way the given regions should follow in agrarian production and as well the question concerning EU subsidies which support mostly environmental development of the countryside.

Fig. 6: *Potential profitability of the crop production and the biomass production according to the regions of Slovakia*



Source: author

Profitability of the crop production according to the production areas

The classificatory criteria for the agricultural landscape differentiation have been elaborated in the past. The agricultural landscape was divided into so called production types according to the crop growing successfulness. There are well known maize, beet, potato or mountain production areas. Quantitative and qualitative analysis of the natural and economic potentials using geographical informative systems specified present characteristics of these areas.

The maize production area takes 37% of the agricultural landscape, predominant soil type is Chernozem (32%), soils are mostly in the slopes to 3°, without skeleton, deep, as to the granularity medium heavy and their quality is evaluated in point value 74 points.

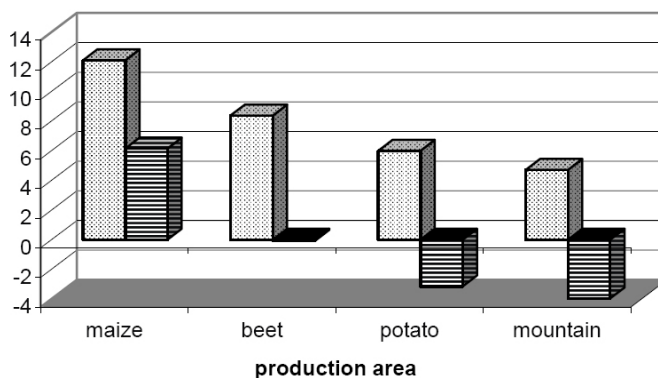
The beet production area takes 22% of the agricultural landscape, predominant soil type is Chernozem (25%), soils are mostly in the slopes to 3°, without skeleton, deep, as to the granularity medium heavy and their quality is evaluated in point value 51 points.

The potato production area takes 27% of the agricultural landscape, predominant soil type are Cambisols (63%), soils are mostly in the slopes to 7-12°, strongly skeletal, shallow, as to the granularity medium heavy and their quality is evaluated in point value 27 points.

The mountain production area takes 14% of the agricultural landscape, predominant soil type are Cambisols (75%), soils are mostly in the slopes to 7-12°, strongly skeletal, shallow, as to the granularity medium heavy and their quality is evaluated in point value 19 points.

At present structure of utilization of these agricultural landscapes and under existing economic conditions (costs, prices) it can be observed that without subsidiary impulses in the crop production only the maize production area is profitable, the beet production area is on the boundary of profitability and the potato and mountain production areas are not profitable for the intensive crop production (Figure 7).

Fig. 7: *Potential profitability of the crop production and the biomass production according to the production areas*



■ solids biomass production (t/ha) ■ profitability rate (%)

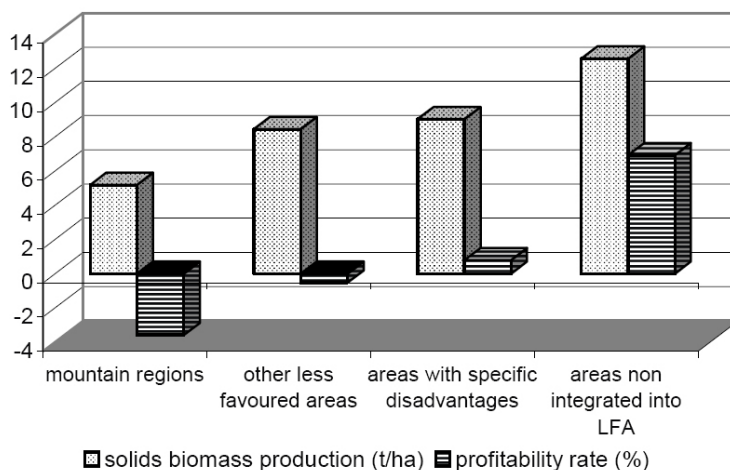
Source: author

Profitability of the crop production according to the less favoured areas (less favoured areas - LFA)

Subsidiary policy of the agricultural department is predominantly coming out the so called less favoured areas. There are mountain areas (20%), other less favoured areas (16 %) and areas with specific disadvantages (14%) in this classification of the landscape. Areas which are not integrated into the less favoured take 50 % of the agricultural landscape. The landscape quality expressed in one hundred scale is the highest in regions which are not integrated into the less favoured areas (78 points), followed by the areas with specific disadvantages (49 points), other less favoured areas (43 points) and mountain areas (22 points).

The results of our investigation indicate that the mountain areas do not reach either the half of the production potential of the areas do not integrated into LFA. The growing of the agricultural crops without subsidies is profitable only in the areas do not integrated into LFA. Specifically less favoured areas are on the boundary of profitability and other less favoured areas and mountains areas are for the agricultural crop growing uneconomic (Figure 8). From this point of view the subsidiary policy applied in Slovak territory by the European Union is rational. It concerns the entrepreneurs on the agricultural landscape and concerns also the support of the less favoured areas. The question is only the degree of specifics, that means regarding local, predominantly soil specifics of individual users of the landscape within the cadastre or municipality.

Fig. 8: Potential profitability of the crop production and the biomass production according to the less favoured areas



Source: author

CONCLUSION

Soil characteristics significantly influence the productive potential of the crop production and it is reflected in the profitability of the agricultural crops growing. The biomass yield is correlated to the soil quality. Mostly the soils of the following types Mollic Fluvisols, Chernozems, Haplic Luvisols, Fluvisols, Albic Luvisols, Planosols are with regard to the biomass production and the crop production profitability the assurance of effective production. Regarding the prediction of the relation between the soil parameters and the profitability of the crop production it is obvious that agricultural crops growing without subsidiary impulses is profitable only on the slopes below 7°, in the soils without skeleton, deep soils and medium heavy soils.

Heterogeneity of the soil conditions in Slovakia differentiate the level of the crop production in the individual regions, both economically and productively. The crop production as a whole is profitable only in Bratislava, Trnava and Nitra from the regional point of view, then it is the maize production area and so called less favoured areas.

Acknowledgement: This work has been carried out within the project VEGA 1/4366/07 "Pedogeographical aspects of multicultural use of agricultural landscape", the project APVV 27-036602 "Information system about exploitation of agricultural landscape potential to support of region development" and the project APVV-0124-06 "Regional particularities of soil protection and use in agricultural landscape".

References

- DŽATKO, M. (2002): Evaluation of the productive potential of the agricultural landscape and the soil-ecologic regions in Slovakia. VÚPOP, Bratislava, 88 s., ISBN 80-85361-94-9 (in Slovak).

- KOVÁČ, K. et al. (2003): General plant production. SPU, Nitra, 335p., ISBN 80-8069-136-3 (in Slovak).
- LINKEŠ, V., PESTÚN, V., DŽATKO, M. (1996): Handbook for using of BSEU. VÚPÚ, Bratislava 43 p. ISBN 80-85361-19-1 (in Slovak).
- MICHAELI, E. (1999): Regional geography of the Slovak Republic. FHPV PU, Prešov, 256 p. ISBN 80-88722-41-1 (in Slovak).
- VILČEK, J. (1999): Pedo-ecological parameters of classification and utilization of the agricultural landscape (Final Report). VÚPOP, Bratislava, 113 p. (in Slovak)
- VILČEK, J., HRONEC, O., BEDRNA, Z. (2005): Environmental pedology. SPU, Nitra, 299 p., ISBN 80-8069-501-6 (in Slovak).
- VILČEK, J. (2005): New principles, rules and parameters of the potential utilization of the landscape in Slovakia (Final Report). VÚPOP, Bratislava, 81 p. (in Slovak)

POTENCIÁL RENTABILITY RASTLINNEJ VÝROBY V REGIÓNOCH SLOVENSKA

Zhrnutie

V príspevku boli stanovené konkrétne potenciálne hodnoty produkcie sušiny i rentability výroby pre najrozšírenejšie pôdne typy, kategórie svahovitosti, skeletovitosti, hĺbky pôd i zrnitosť. Prepočty potvrdzujú vysokú koreláciu rentability a prírodnej výnosovosti pestovania plodín. Udržateľnú pozitívnu rentabilitu v pestovaní plodín je možné očakávať len v regiónoch so zastúpením Mollic Fluvisols, Chernozems, Haplik Luvisols, Fluvisols, Albic Luvisols and Planosols. Ostatné regióny sú v tomto smere závislé od dotačných stimulov. Analýza zvolených pôdnych parametrov ukázala, že vo všeobecnosti je rastlinná výroba pri súčasných ekonomických podmienkach a bez dodatočných stimulov rentabilná len na rovinách a svahoch do 7°, na pôdach hlbokých, bez skeletu a zrnitostne stredne ťažkých. Tieto poznatky nemusia platiť pre konkrétnu plodinu.

Heterogenita pôd a ich vlastnosti na Slovensku zákonite prináša aj rozdielne produkčné i ekonomické potenciály jednotlivých regiónov. Pozitívne hodnoty potenciálu rentability rastlinnej výroby môžeme očakávať v samosprávnom kraji Bratislavskom, Trnavskom, Nitrianskom a Trenčianskom. Podľa zatriedenia území do poľnohospodárskych výrobných oblastí je potenciál rentability kladný len v kukuričnej a repárskej výrobných oblasti. Podľa rozdelenia územia Slovenska do tzv. LFA (less favoured areas) sú v tomto smere rentabilné regióny do tohto systému nezaradené, resp. aj oblasti so špecifickými nevýhodami. Príspevok v textovej i grafickej forme uvedených diferencií v potenciáloch produkcie biomasy i rentability jej výroby podrobne analyzuje a to tak z pohľadu pôdnych vlastností, ako aj pre poľnohospodárstvo relevantných regiónov.

Recenzovali: Prof. h.c. prof. Ing. Ondrej Hronec, DrSc.
Prof. RNDr. Eva Michaeli, PhD.

POTENTIALS OF AGRICULTURAL CROPS CULTIVATION WITH REGARD TO SOIL CONDITIONS

Jozef VILČEK¹, Radoslav BUJNOVSKÝ²

Abstract: Soil environment, as integral part of Earth issues, plays important role at defining of ecosystem functioning and life quality of human. This environmental issue significantly influences the state and evolution of ongoing biotic and abiotic processes. Most frequently the soil is related to production of agricultural crops quantity and quality of them is directly affected by soil properties. In the paper the soil environment and its influence on the potentials of arable crops cultivation was analysed through the following parameters: soil type, soil-climatic conditions, sloppiness, slope orientation, skeleton content and texture. With regard to mentioned parameters there were defined areas of very suitable, suitable, less suitable and unsuitable ones for cultivation of 15 arable crops, 12 types of vegetable and 9 types of bio-energetic crops. It is possible to state that potentials of crops cultivation directly reflect the quality of soil environment.

Key words: Soil types, site conditions, crop yields, field crops, vegetables, bio-energetic crops, suitability of crop cultivation

INTRODUCTION

Economic aspects predominate in decisions on structure of agricultural land use and distribution of cultivated crops. Such a way and view on land use induces that in traditional natural conditions there often can be found non-traditional crops. Successfulness of their cropping then is directly related to mutual tolerance of given crop and environment.

Till now presented optimisation systems of spatial crop allocation (e.g. Benda et al., 1963; Korbini and Facuna, 1978) were based on the need "to meet the plan" or the need to provide to population sufficient amount of food. From this reason there was increased pressure on the soils with highest quality that were earmarked for strategic and economy significant crops. Placing the remaining crops was oriented to worse natural and site conditions.

At present, also with regard to making free of mentioned pressure, it can be seen that to the theory of traditional cropping areas in practice we can have some reservations. As typical example we can mention potatoes as well as other crops cultivation of them is gradually oriented to lowland locations where they were almost non-cultivated. Conversely some thermophilic crops such as grain maize are occurring also in climatically less favoured sub-mountains and mountains areas. It is necessary to take into account also ongoing climate change that may play dominant role at territorial crop distribution. It is noticeable that optimal spatial distribution of crops in agricultural land requires individual

1 **Prof. Ing. Jozef Vilček, PhD.,**

Department of Geography and Regional Development, University of Prešov, ul. 17. novembra 1, 081 16 Prešov, e-mail: vilcek@vupop.sk

2 **Ing. Radoslav Bujnovský, CSc.,**

Soil Science and Conservation Research Institute, 827 13 Bratislava, Gagarinova 10, e-mail: bujnovsky@vupop.sk

approach and respecting the features of given crop in concrete site. Such procedure requires sufficiency of information and access to broad base of knowledge from different disciplines.

MATERIAL AND METHODS

Evaluation of soil with regard to cultivation of agricultural crops is based on exact and potential data on given crop. Because the suitability of cropping is qualified especially by really reached production, this factor has played crucial role at categories creation. Concrete data on yields and economic parameters were obtained from more than 250 agricultural enterprises as well as from issues of Statistical office of Slovak Republic (temporal yield series of selected crops). Because production and economic parameters of successfulness of cropping are directly related to soil-climatic conditions there were analysed and used also data on climatic regions of Slovakia, sloppiness, skeleton content, soil thickness, soil types, point value of soil productivity as well as typological-production soil categories. These data were taken from soil information system (containing also spatial distribution of soil-ecological units) that is administrated by Soil Science and Conservation Research Institute (Linkeš et al., 1996, Džatko 2002).

Dependence of observed indicators on soil production function, expressed as point value in 100 points was tested nonlinear polynomial regression analysis. On the base of this relationship were estimated regression equations with help of them to each soil-ecological unit (BPEJ) was assigned potential yield of individual crops, share of these crops within crop rotation as well as potential economic parameters (gain, costs, benefit or loss). With help of geographic information system ArcMap was on the base of vectorized bonity maps in scale 1:5000 as well as aerial distribution of observed factors was differentiated and quantified the degree of suitability of soils for cropping of arable crops. Quantification of suitability of arable crops cultivation was based on the following data:

- database of Soil science and Conservation Research Institute on soil-ecological units (BPEJ) and evaluation of these units in 100 point scale (Džatko 2002)
- soil categorization by climatic region, category of sloppiness, soil texture and skeleton content (Linkeš et al., 1996)
- typological and production categorization of agricultural soils (Džatko 2002) and database of production and economic parameters by BPEJ (Vilček 1999)
- really attained crop yields on the level of farm, district and region
- economic parameters (proceeds, financial gains, costs) at crop cultivation and real crop distribution on arable land.

RESULTS AND DISCUSSION

Agricultural land and especially soil represent great natural potential than can be used by human according to his needs and interests. It is capital that in the interest of sustainable use of natural resources must not be bargain away and degraded, respectively. Global environmental strategy and policy heads towards the landscape use that is ecologically acceptable, economically effective and socially fair. With mentioned philosophy corresponds such use of agricultural soil where crop requirements are in harmony with environment properties.

Knowledge on individual crop demands on surrounding environment as well as knowledge on potential of given site is the basic condition for effective use of landscape. Even from this reason it is necessary permanently refer to suitability of crops/plants cultivation on agricultural soils. Therefore in this paper is focused on crops usually cultivated in our conditions (including vegetable) as well as crops that can be used from view of global problems (energetic crops). For each crop were defined areas very suitable, suitable, less suitable and unsuitable for its cultivation. This categorization is illustrated also by map schemes that with regard to limited space are not introduced. These materials consist of general sources obtained from detail information databases especially on soil properties that were processed in geographical information system ArcMap.

With regard to heterogeneous natural conditions, potential of agrarian land of Slovakia shows to be regionally different. Most favourable conditions for cultivation of agricultural crops are in lowland conditions where also occur the soils with higher quality. It does not mean that other regions can not be competitive to mentioned conditions. In every area it is possible to find the crops for cropping of them are good preconditions and thus also economic interesting.

The results shows that the highest potential for cropping of cultural plants by soil types in Slovakia have Haplic Chernozems, followed by Mollic Fluvisols, Haplic & Calcic Luvisols, Fluvisols, Regosols, Albic & Albi-Distric Luvisols, Planosols, Cambisols and Rendzic Leptosols (by WRB 1994 and Kolektiv 2000). More detail soil categorization by sub-types and varieties (taxonomical unit of third order used in Slovak national soil classification) shows that with regard to better moisture regime the most productive soil is calcareic Mollic Fluvisols. Concrete yields of selected crops by soil types are introduced Table 1.

Tab. 1: Yield potentials by soil types ($t \cdot ha^{-1}$)

Crop	Soil type								
	1	2	3	4	5	6	7	8	9
Winter wheat	5.45	5.22	4.87	4.88	4.66	4.43	4.15	4.08	3.90
Rye	4.05	3.91	3.73	3.73	3.62	3.51	3.38	3.35	3.28
Spring barley	4.64	4.41	4.09	4.09	3.92	3.70	3.48	3.43	3.29
Grain maize	4.84	4.55	4.27	3.99	4.10	3.71	3.54	3.51	3.45
Pea	2.72	2.52	2.27	2.27	2.16	1.99	1.85	1.82	1.73
Oil rape	2.64	2.53	2.36	2.37	2.24	2.13	1.97	1.93	1.82
Potatoes	16.38	14.93	13.51	13.35	13.19	12.32	12.06	12.10	12.08
Sugar beet	33.58	33.32	32.71	31.88	31.62	29.59	27.59	26.90	25.72
Silage maize	28.05	26.30	24.51	24.34	24.00	22.88	22.39	22.39	22.23
Perennial forages	8.72	7.94	7.15	7.07	6.93	6.44	6.23	6.23	6.17

¹Haplic Chernozems, ²Mollic Fluvisols, ³Haplic & Calcic Luvisols, ⁴Fluvisols, ⁵Regosols, ⁶Albic & Albi-Distric Luvisols, ⁷Planosols, ⁸Cambisols, ⁹Rendzic Leptosols

Source: authors

In comparison to arable crops and vegetables, the productivity of soil types with regard to several energetic crops and their different demands on the environment has another hierarchy.

Potentially achievable biomass production of agricultural crops is significantly influenced by climatic conditions. There is observed that dry matter production per hectare of agricultural soils is in very cold and moist climatic region lower nearly by half in comparison to very warm and dry climatic conditions of lowlands. It is objective reality that is necessary to take into account at spatial allocation of crops and structure of crop production as whole.

Decline of production due to increasing sloppiness is markedly evident at cultivation of agricultural crops on arable land. Research results confirm inverse relation of crop yields and sloppiness. Especially sensitive on this factor are vegetables. So, most of them are cultivated on flat land because on the slope increases risk of several water erosion.

Slope orientation plays very important role at selection of crops. Especially significant is the productivity difference of soil situated on south oriented slopes in comparison to the soil placed on north-oriented slopes. While on south-oriented slopes the potential of total biomass production of cultivated crops is 9.6 t/ha of dry matter, on north-oriented slopes it is only 6.7 t/ha that means lower by 31%. The factor of slope orientation is especially important at placing of thermophilic crops.

Skeleton content as most coarse fraction of soil texture also significantly influences formation of biomass of agricultural crops. In average soils without skeleton are capable to produce 11.8 t/ha DM of biomass while the soils with high content of skeleton only 2.4 t/ha. Logical differences in observed parameters were noted also at categories of soil depth and soil texture. Distribution of individual suitability categories of agricultural soils for cultivation of main field crops/plants are introduced in the following tables.

Tab. 2: *Categorization of soils by cropping suitability of typical field crops (%)*

Crop	Soils			
	very suitable	suitable	less suitable	non-suitable
Winter wheat	28.7	25.4	9.2	36.7
Rye	12.0	21.2	3.1	29.7
Spring barley	20.0	23.8	24.1	32.1
Oats	23.6	20.1	19.2	37.1
Grain maize	14.4	16.8	17.1	51.7
Pea	15.6	20.9	29.2	34.3
Bean	19.0	11.2	3.8	66.0
Sugar beat	19.9	18.2	3.1	58.8
Potatoes	11.8	12.3	3.8	43.1
Oil rape	23.2	31.0	1.8	32.0
Sunflower	18.8	24.9	1.6	39.7
Soya	25.0	19.9	3.7	51.4
Poppy	18.1	14.7	22.0	45.2
Flax	14.9	24.6	17.4	43.1
Hop	16.7	2.5	0.1	80.7

Source: authors

Tab. 3: *Categorization of soils by cropping suitability of field vegetable (%)*

Vegetable	Soils			
	very suitable	suitable	less suitable	non -suitable
Cabbage, kale, kohlrabi	22.3	4.6	4.9	68.2
Chinese cabbage, cauliflower, broccoli	21.8	3.6	4.6	70.0
Celery	20.3	3.9	1.9	73.9
Carrot, parsley, parsnip	16.8	2.2	3.6	77.4
Redroot	16.6	4.2	3.9	75.3
Cucumber	12.1	5.3	0.1	82.5
Melon	1.7	9.2	2.1	87.0
Pumpkin, courgette, pattypan squash	14.7	5.4	1.0	78.9
Pepper	8.2	3.0	0.8	88.0
Tomato	14.3	5.0	0.4	80.3
Onion, garlic, leek	3.0	15.2	2.0	79.8
Asparagus	2.4	1.2	0.4	96.0

Source: authors

Tab. 4: *Categorization of soil by cropping suitability of energetic crops (%)*

Crop	Soils			
	very suitable	suitable	less suitable	non-suitable
Poplars and willows	23.8	14.8	20.5	40.9
Sorghum	6.2	7.8	18.2	67.8
Amaranth	12.4	5.3	14.7	67.6
Hemp	8.1	9.0	28.7	53.3
White sweet clover	16.0	28.1	14.5	41.4
Giant knotweed	11.5	16.4	7.2	64.9
Sorrel of Uteusch	12.2	13.2	13.9	60.8
Reed canary grass	14.6	3.5	18.3	63.6
Silvergrass	11.7	7.2	11.6	69.5

Source: authors

CONCLUSIONS

Human existence is also on the start of new millennium still dependent on potentials of natural environment. Change in societal, political and social conditions directly influences the landscape use. In this context agrarian landscape and especially soil plays unsubstitutable role especially at provision of trophic function of whole Earth ecosystem.

Although targeted cultivation of cultural plants helps to human to solve his food security, agri-ecosystems are still more and more used for non-food purposes. At present, especially in developed countries that have not problems with food sufficiency, it is forced through the trend of use of agricultural soil for cropping of energetic crops. It is possible to assume that agricultural soil in the future will be used on other non-production or ecological purposes. From this aspect it is useful to know the conformity of given soil to cropping of concrete crops and limiting factors for their cultivation. The paper pointed out on the potential of field crops cultivation from view of soil properties.

Acknowledgement: The paper was prepared on the base of results of APVV project No. 0124-06 and simultaneously is also the output of VEGA project No. 1/4366/07, and RTD project Multifunctional use of Slovak soils No. 2006 UO 27/090 03 03/090 03 19 supported by Ministry of Agriculture SR.

References

- BENDA, J. a kol. (1963): Rajonizace zemědělské výroby v ČSSR. II díl. SZN, Praha, 1963, 364
- KOLEKTÍV (2000): Morfogenetický klasifikačný systém pôd Slovenska. VÚPOP, Bratislava, 76 s., ISBN 80-85361-70-1
- KORBÍNI, J., FACUNA, J. (1978): Zóny vhodnosti pestovania hlavných poľnohospodárskych plodín v SSR. Príroda, Bratislava, 1978, 111 s. ISBN 64-223-78.
- LINKEŠ, V., PESTÚN, V., DŽATKO, M. (1996): Príručka pre používanie máp bonitovaných pôdno-ekologických jednotiek. VÚPÚ, Bratislava, 1996, 43 s. ISBN 80-85361-19-1.
- DŽATKO, M. (2002): Hodnotenie produkčného potenciálu poľnohospodárskych pôd a pôdno-ekologických regiónov Slovenska. VÚPOP, Bratislava, 2002, 88 s. ISBN 80-85361-94-9.
- VILČEK, J. A KOL. (1999): Pôdnoekologické parametre usporiadania a využívania poľnohospodárskej krajiny (záverečná správa za VTP). VÚPOP, Bratislava, 1999, 133s.
- VILČEK, J., BEDRNA, Z. (2007): Vhodnosť poľnohospodárskych pôd a krajiny Slovenska na pestovanie rastlín. VÚPOP, Bratislava, 2007, 248 s., ISBN 978-80-89128-36-5.

POTENCIÁLY PESTOVANIA POĽNÝCH PLODÍN VZHLADOM NA PÔDNE PROSTREDIE

Zhrnutie

Pôdne prostredie, ako neodmysliteľná súčasť zložiek Zeme, zohráva dôležitú úlohu pri definovaní kvality života ľudí i ostatných ekosystémov. Výraznou mierou ovplyvňuje vývoj a stav prebiehajúcich biotických i abiotických procesov. Najčastejšie je pôda spájaná s produkciou poľnohospodárskych plodín, kvalita i kvantita ktorých sa od pôdných vlastností priamo odvíja.

V príspevku sme pôdne prostredie a jeho vplyv na potenciály pestovania poľných plodín analyzovali parametrami: pôdny typ, pôdno-klimatické pomery, svahovitosť, expozícia svahu, skelet a zrnitosť (textúra). Vzhľadom na uvedené parametre sme následne pre 15 klasických poľných plodín, 12 druhov zeleniny a 9 tzv. energetických rastlín vygenerovali oblasti Slovenska pre ich pestovanie veľmi vhodné, vhodné, málo vhodné a nevhodné. Môžeme konštatovať, že potenciály pestovania poľných plodín na Slovensku priamo odrážajú kvalitu pôdneho prostredia.

Recenzovali: Prof. h.c. prof. Ing. Ondrej Hronec, DrSc.
Prof. RNDr. Eva Michaeli, PhD.

ACTA FACULTATIS STUDIORUM HUMANITATIS ET NATURAE
UNIVERSITATIS PREŠOVIENSIS, PRÍRODNÉ VEDY, XLVII.
FOLIA GEOGRAPHICA 12

**SPECIAL ISSUE FOR THE 31TH IGU CONGRESS,
TUNIS 2008.**

FOLIA GEOGRAPHICA 12

Editor: RNDr. Radoslav Klamár, PhD.
Autor: kolektív
Za jazykovú stránku príspevkov zodpovedajú ich autori.
Náklad: 300 výtlačkov
Rozsah diela: 294 strán
AH: 19,84
Vydavateľ: Prešovská univerzita v Prešove,
Fakulta humanitných a prírodných vied
Vydanie: prvé, 2008
Formát: B5
Sadzba: Ing. Ladislav Nagy
Tlač: GRAFOTLAČ Prešov

ISSN 1336-6149 (Acta Facultatis Studiorum Humanitatis et Naturae
Universitatis Prešovensis, Prírodné vedy)

ISSN 1336-6157 (Folia Geographica)