Proceedings of
19th International Conference

GEOGRAPHY AND GEOINFORMATICS:
CHALLENGE FOR PRACTISE AND EDUCATION

Brno, September 8-9, 2011

MASARYK UNIVERSITY
FACULTY OF EDUCATION

Proceedings of 19th International Conference

GEOGRAPHY AND GEOINFORMATICS: Challenge for Practise and Education

Edited by Hana Svobodová

Brno 2012

Reviewers:
doc. RNDr. Alena Dubcová, CSc.
doc. PaedDr. Eduard Hofmann, CSc.
doc. RNDr. Jaromír Kolejka, CSc.
doc. RNDr. Alfred Krogmann, PhD.
Mgr. Daniel Seidenglanz, Ph.D.
RNDr. Aleš Ruda, Ph.D.
PhDr. Mgr. Hana Svatoňová, Ph.D.
doc. RNDr. Antonín Vaishar, CSc.
Cynthia Milles (langure reviewer)

Editor:
RNDr. Hana Svobodová, Ph.D.

ISBN 978-80-210-5799-9

CONTENT

INTRODUCTION

Dear colleagues,

We are glad that we had the opportunity to meet you for the tenth time at the Masaryk University Faculty of Education conference, Geography and Geoinfomatics – Challenge for Practise and Education.

The proceedings of the conference, which was held on 8-9 September 2011, contain 63 papers which are arranged thematically into four main sections:

1) Changes of Landscape – Environmental Aspects,
2) Regional Geography and Regional Development – Opportunity for Practice,
3) Geoinformatics for Practice,
4) Impacts of Curricular Reform on Geographic Education.

Best papers selected by reviewers are published in the printed part of the proceedings which you are holding, rest of the papers are loaded on the CD-ROM.

I believe that you will find lots of new knowledge and interesting ideas in the proceedings for use in your future work, especially for application in practise and education.

In conclusion, we would like to invite you to the twentieth anniversary conference which will be held in September 2012. It will be hosted by our partner department in Nitra.

Hana Svobodová

Editor of the proceedings

CHANGES OF LANDSCAPE – ENVIRONMENTAL ASPECTS

THE DEBLIN(SKO)-LOCALITY: PHYSICAL LANDSCAPE

Alois Hynek

Department of Geography, Faculty of Science, Masaryk University

Kotlarska 2, 611 37 Brno

hynek@sci.muni.cz

Abstract: *In the frame of international project LENSUS the Deblín-locality served as a pilot area for sustainability education. The project also included physical landscape study based on analysis of cartographical data sources and field survey. We succeeded in the construction of composite physico-geographical spatial units using intensive research methods and concerned on studying materiality of physical landscape spatial units. As well as intensive social research provided remarkable results in university-basic school-families cooperation when the households expressed deep interest in the topic of sustainability and community is still living with project. (Grand)parents were surprised by the practices of the project and welcome the results for their living.*

Key words: *physical landscape, components and composite spatial units, materiality, intensive study*

INTRODUCTION

Physical landscape is an evergreen topic in tradition of continental geography. Not so in the Anglo-Saxon tradition. As WYLIE (2007, 8, 14) mentions, landscape is a ways of seeing and he splits landscape into 'material and mental aspects, objective and subjective, science and art, nature and culture'. For my Dept. of Geography a landscape has been involved in physical geography since 1973 and linked with ecology/environmental studies. Since 1982 when IALE (International Association of Landscape Ecology) has been established in Slovakia (the author was one of co-founders) it is landscape ecology – a transdisciplinary approach to landscape as a set of landscape ecosystems that plays the key role also in applications. Physical geography is a starting point to physical landscape study including all material component – landforms/lithology, climate, hydro-cycle, soil cover, biocenoses and their composite spatial units, assemblages in the sense of DELEUZE & GUATTARI (1987, 2009). An ecosystem concept creates the main part of another project – sustainability. We accept it with respect to Millennium Ecosystem Assessment

(ALCAMO et al., 2003). An ecosystem is understood as capital, providing services tu humus and also other ecosytems.

Landscape, including physical one, is a form of spatiality intended to humans/nature interactions, in the case of physical landscape the interactions between physical components of it (HYNEK 2009).

The Deblin-locality, from a geomorphological point of view, is a remnant of faulted dome with contemporary shape of ´horseshoe´ – an elevation with its base at 240 m above sea level and the summit at 540 m a.s.l. It is comprised of a very wide collection of metamorphic and sedimentary rocks covered with earth/slope sediments and soil cover consisting of cambisols, (para)luvisols, pseudogleys and leptosols. The topoclimate is mildly warm and moist with sunny and shady spots. At the foot of the dome five streams can be seen flowing around it with average discharge up to 8 $m^3.s^{-1}$. Their autochthonous tributaries from the Deblin dome are strongly influenced by the dissected terrain. The former *Ulmi fraxineta carpini, Carpini querceta, Fagi querceta + typica* and *Querci fageta* were almost de/reterritorialized into cultural forests, cultivated fields, orchards, meadows and villages/country town settlements. It includes 9 municipalities with 3,156 inhabitants in an area of 56.8 km^2 as a part of the town region of Tisnov, a marginal suburban town of Brno. Deblin is a part of Tisnov-region (Tisnov-town population: 8,704 inhabitants) and the city of Brno (population: 404,067 inhabitants). Large-scale agriculture (since the 1950s) and Saxon-type forestry (since the 1750s) strongly influenced rural landscaping, causing biodiversity depletion, a monotonous landscape character, accelerated anthropogenous soil erosion and run-off with impacts on the human environment (HYNEK A. et al., 2010).

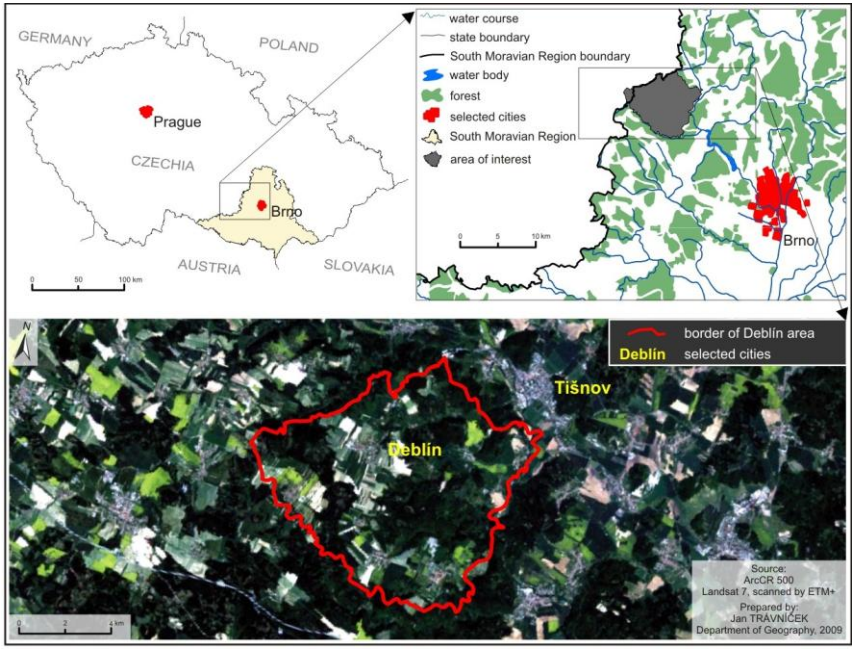


Fig. 1: The Deblin/locality – location.
Source: HYNEK et al., 2010.

METHODOLOGY

Geographical study of physical landscape is zooming its attention on spatiality of its components using data from non-geographical disciplines and its field/study - mapping spatial units, as far as possible at the local/topic level, molecular in the sense of DELEUZE& GUATTARI (2009, 229). There is very instructive concept of physical landscape study presented by PREOBRAZHENSKIY, 1984:

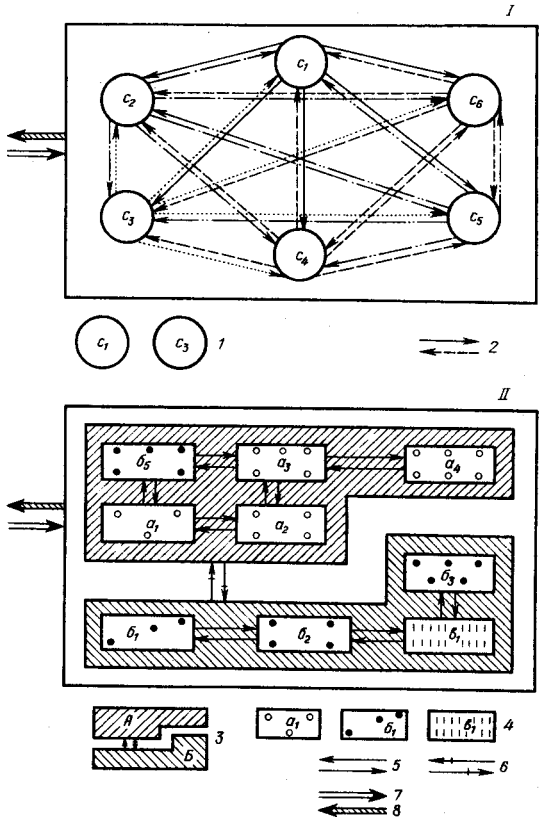


Fig.1. MODELS - CONCEPTIONS OF A LANDSCAPE (After Preobrazhenskiy, 1967)
I - monosystems model, II - polysystems model.
1 - components; 2 - relation of components; 3 - geosystems of "n" rank; 4 - geosystems of "n-1" rank; 5 - relation of geosystems of "n-1" rank; 6 - relation of geosystems of "n" rank; 7, 8 - relations with environment.

Fig. 2: Mono/polysystems models of landscape.
Source: PREOBRAZHENSKIY, 1984, 18.

Another up-to-date unsurpassed performance in landscape ecological mapping comes from HAASE (1984).

I agree with KOLEJKA (2011) who is strongly critisizing contemporary declined state of the Czech landscape study based on mechanistic manipulation

with uncontrolled data though processed in advanced GIS technologies however without understanding landscape reality. It could be add: landscape materiality. In this context we can follow new (critical) materialisms studies, e.g. COOLE and FROST (eds. 2010), BENNETT (2010), BRYANT, SRNICEK and HARMAN (2011). The materiality studies are also based on intensive research methods. We must not forget the ecological materiality of the cities (HEYNEN,KAIKA,SWYNGEDOUW 2006) and non-representational approaches in geography, opened by N. Thrift, the latest from ANDERSON and HARRISON (2010).

In the hands of advised specialist on GIS technologies, in the case of Deblin-locality it is PhD. student Jan Travnicek we jointly produced all the series of thematic maps covering physical landscape using critically the sources of various institutions starting with the scale 1:10,000 up to 1:50,000. This locality has its own thematic atlas! Not only maps of physical landscapes but also human/cultural geography ones (TROJAN and TRAVNICEK, 2011).

PHYSICAL LANDSCAPE COMPONENTS

Landforms

New development in the Czech geology offered more precise knowledge for study of landforms, different from contemporary views in the Czech geomorphology. It is a monograph of CHÁB et al. (2008) providing new spatiality of morphostructures in the Czech Massif, very welcome contribution for intensive study of landforms. Prevailing orientation of the Czech geomorphology on relief genesis has been changed here in favour for relief/terrain as factor influencing other physical components and human decisions (transport, construction, agriculture, recreation, etc.). Relief/terrain is in that case interpreted as translator of matter/energy flows (DYAKONOV, 1975). Very speculative debate on planation surfaces was omitted and more effort was paid to landforms applying approach of SPIRIDONOV (1975, 7) who recognized elementary surfaces a lines on landform bodies and eventually their groups.

We cannot forget the treatise of HRÁDEK (2000) and thesis of KUBALÍKOVÁ (2005) who contributed to terrain analysis, e.g. tectonic forms, karst, gully erosion, etc. We continued in identification of landforms as valleys (slopes, bottoms and edges), gorges, ridges, troughs, hills, step faults, (inclined) plains, terraces, basins, dells. These landforms are physical bodies covered with soils, vegetation, exposure to sun-rays, specific run-off, anabatic/katabatic winds. It is very important i physical landscape study. I must

strongly evaluate the cartographic and GIS assistance of J. Trávníček who helped me with terrain morfology on his excellent thematic maps.

Topoclimate

Less known in landscape practices, more frequent term is mesoclimate in the sense of Czech geographer E.QUITT. But he was also very active in local climate studies, he is the author of Topoclimatic map in the scale 1:50,000 covering 80% of the Deblin-locality. His topoclimatic analysis includes next attributes for the upper part of the Deblin-locality, QUITT (1994, 52):

Topoclimate of Highlands

19 - topoclimate of peak parts distinctly protruding above the surroundings, 20 - topoclimate of convex formations merging with the surroundings (peak plane), 21 - ditto with the low loose housing, 22 - topoclimate of slopes under very good solar irradiation, 23 - ditto with a possibility of pronounced catabatic flow, 24 - topoclimate of slopes under normal solar irradiation, 25 - ditto with the low loose housing, 26 - ditto with a possibility of pronounced catabatic flow, 27 - topoclimate of slopes under minor solar irradiation, 28 - ditto with a possibility of pronounced catabatic flow, 29 - topoclimate of deeply incised valleys, 30 - ditto with the low loose housing, 31 - topoclimate of indented formations with pronounced local temperature inversions, 32 - ditto with the low loose housing, 33 - topoclimate of indented formations with less pronounced local temperature inversions, 34 - ditto with the low loose housing.

We completed this sheeet and The Atlas of Deblin-locality is including in it, spatial data are also in the Table 1.

Hydro-cycle

Water balance of Deblin-locality abounds in contrasts: summit planation surface is relatively dry, especially in vegetation season whereas on the margin border we can find watercourses with dominant the Svratka-river. Its discharge reaches average value $8m^3.s^{-1}$, centenial: $365m^3.s^{-1}$, the output from Deblin-locality into the Svratka-river is about 3 litres $.km^{-2}.s^{-1}$. The tributaries of the Svratka-river create in ground plan ´a wheel round the island´. The reason of relative drought of water balance is in the very thin layers of regolith covering basement crystalline rocks with limited retention od ground water. The water retention of ground crystalline rock is also very limited for deficiency in pores. We can describe the run-off process as accelerated, especially in deforested areas. However this process could be mitigated by collecting precipitation, not only rains but snow, too. If you have a roof with the surface of 10x10 metres and annual precipitation reaches 500 mm, you have almost $50m^3$ of water at disposal.

Soil cover

Traditional account of soils, very common not only in geography, can hardly be a real spatiality of soil cover including all soil taxons. We prefer the concept of FRIDLAND (1972,1975) who developer ´the structure of soil cover´ . Accepting his ideas we submit the solution for Deblin-locality:

RANKER
lithic variations
catenas: ranker- colluvisol-lithosol
tachets: ranker-cambisol
RENDZINA
contrast mosaics: rendzina-lithosol-ranker-pararendzina
PARARENDZINA
contrast mosaics: pararendzina-rendzina-lithosol-ranker
FLUVISOL
palletes/spottinesses: fluvisol-gleysol
PARALUVISOL/ LESSIVÉS-PARABRAUNERDE
palletes/spottinesses: paraluvisol -luvisol-pseudogleysol
mosaics: hnědozem-kambizem
LUVISOL
palletes/spottinesses: luvisol-paraluvisol-pseudogleysol
CAMBISOL
catenas: cambisol-ranker-litozem
mosaics: cambisol-paraluvisol-luvisol
PSEUDOGLEYSOL
palletes/spottinesses: pseudogleysol-luvisol-paraluvisol
GLEYSOL
palletes/spottinesses: gleysol- fluvisol

Phytogeocenoses

Contemporary cultural landscapes are modifications of former physical ones transformed by humans. It is a serious problem to reconstruct the former vegetation before human impact, especially after process of deforestation. We also recognize potential vegetation – contemporary one in the case of absenting human impact. There is an option of realist approach using vast collection of data in the Czech forestry. The state has its own institution : The Institute of forests econonomic management (IFEM/ÚHÚL) in Brandýs n.L.-town. Searching for economically optimal composition of trees in the forest plantations edaphic conditions play the main role. The specialists do survey for edatops identification in the scale 1:10,000 and they have experience with choice of trees composition intended for edatops. For that reason their thematic maps present very advanced data for reconstruction of potential vegetation in the terms of phytogeocenoses. They are applied for the forested landscape of Deblín-locality (see Table 1)

PHYSICAL LANDSCAPE COMPOSITE SPATIAL UNITS

While in Slovak physical geography is complex physical geography quite common matter, Czech physical geography is very traditional, conservative in this topic. Not so Polish, German, Hungarian physical geographies. There are various systems of taxonomic physico-geographical complex/composite spatial

units, we prefer as elementary unit the top and their groups – polytops associated in monomicrochores. The German equivalent for polytops is nanochore, Russian – facija (фация) eventually microchore/урочище.

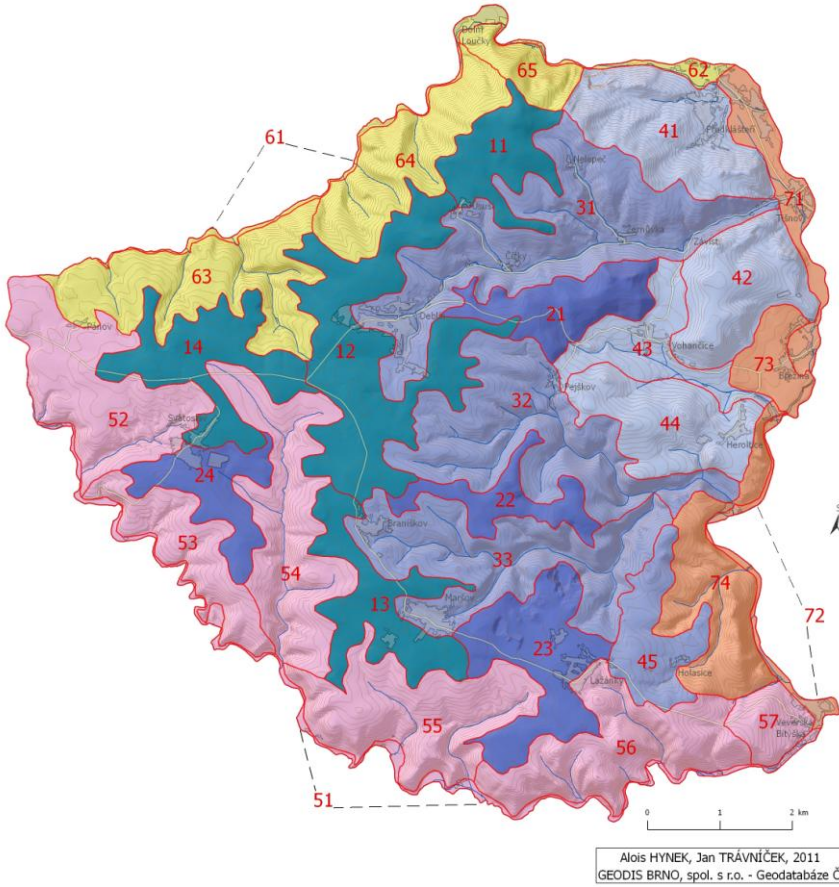


Fig. 3: Physical landscape monomicrochores in Deblín-locality.
Source: HYNEK, TRÁVNÍČEK, in SVOZIL, HYNEK, eds. 2011.

Legend: 1 – upper horseshoe plateau rim, 2 – inner middle ridges with scattered karst, 3 – trough valleys, 4 – lower plateau/steps/terraces/hills/basin with scattered karst, 5 – the Bílý potok-stream valley, 6 – Blahoňůvka/Libochovka/Loučka stress valleys, 7 – the Svratka-river valley

Another variant:

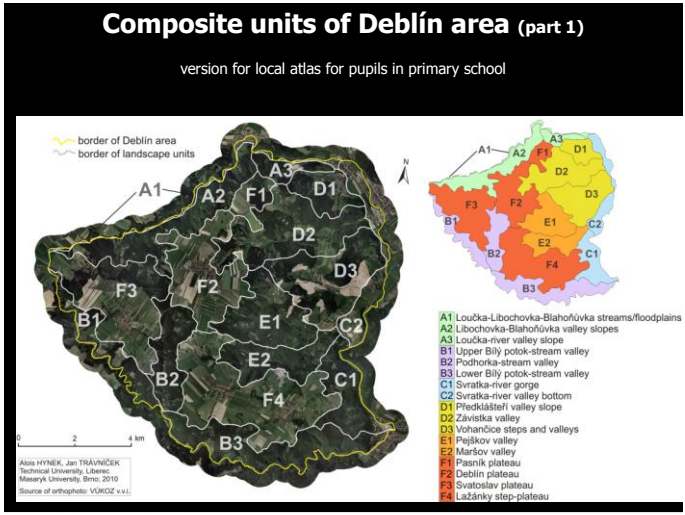


Fig. 4: Physical landscape spatial units of Deblín-locality.
Source: HYNEK et al., 2010

And more detailed table:

Tab 1: Physical landscape composite units in Deblin-locality.

Source: Hynek et al., 2010.

CONCLUSION

The material practicalities of the project have been great surprise for the whole community. We debated on significant landscape elements stated in the official list of landscape/nature conservation for improving biodiversity in Deblín-locality. Run-off study offered the understanding accelerated anthropogeneous soil erosion, low underground water store and the link to sky precipitation collection. Weather forecasts from mass-media were corrected in (ir)radiation air regimes (katabatic/anabatic air circulation). Kaolinite deposits, karst phenomena, rock walls were explained hardly imagined geological/geomorphological history of rocks and landforms starting 500 million years ago in southern polar seas. And GIS technology fascinated everybody. What can we wish more?

REFERENCES

[1] ALCAMO J. et al. Millennium Ecosystem Assessment. Ecosystems and Human Well-being. A Framework for Assessment. A Report of the Conceptual Framework Working Group of the Millennium Ecosystem Assessment. Washington: World Resource Institute, Island Press, 2003. 266 pp.

[2] ANDERSON, B. and HARRISON, P. (eds.) Taking-Place: Non-Representational Theories and Geography. 1st ed. Farnham: Ashgate, 2010. 378 pp. ISBN 978-0-7546-7279-1.

[3] BENNETT, J. Vibrant Matter. A political ecology of things. 1st ed. Durham and London: Duke University Press, 2010. 176 pp. ISBN 978-0-8223-4633-3.

[4] BRYANT, L., SRNICEK, N. and HARMAN, G. (eds.) The Speculative Turn. Continental Materialism and Realism. 1st ed. Melbourne: re.press, 2011. 430 pp. ISBN 978-0-9806-6834-6.

[5] CHÁB J., BREITR K., FATKA O., HLADIL J., KALVODA J., ŠIMŮNEK Z., ŠTORCH P., VAŠÍČEK Z., ZAJÍC J., ZAPLETAL J. (2008): A short geology of the Bohemian Massif fundament and its Carboniferous and Permian cover. 1st ed., Praha: Vydavatelství České geologické služby, 2008. 284 pp. ISBN 978-80-7075-703-1. (In Czech)

[6] COOLE, D. and FROST, S. (eds.) New Materialisms. Ontology, Agency, and Politics. 1st ed. Durham and London: Duke University Press, 2010. 336 pp. ISBN 978-0-8223-4772-9.

[7] DELEUZE, G., GUATTARI, F. A Thousand Plateaus. Reprint, London: Continuum, 1987, 2009. 688 pp. ISBN 13-978-0-8264-7694-4.

[8] DYAKONOV, K.N. Methodological problems in the study of physico-geographical differentiation. In Zvorykin K.V., ed. Problems of Geography, vol.98, Quantitative methods of studying natural environment. Moscow: Mysl, 1975. 214 pp. (In Russian)

[9] FRIDLAND, V.M. On the organizational level of the soil mantle and the systém of regularities in soil geography. In Voprosy geografii, vol.104: Systems research in the study of nature. Moscow: Mysl, 1977, p. 139-152. (In Russian)

[10] FRIDLAND, V.M. Structure of soil cover. 1st ed. Moscow: Mysl, 1972. 423 pp. (In Russian)

[11] HAASE, G. The development of a common metodology of inventory and surfy in landscape ecology. In Brandt J., Agger P. (eds.): Methodology in landscape ecological research and planning, vol. V, Supplementary volume, Proceedings of the first international seminar of the IALE organized at Roskilde University Centre, October 15-19 1984 Roskilde, 1984, p. 68-106. ISBN 87-88183-24-6.

[12] HEYNEN, N., KAIKA, M. & SWYNGEDOUW, E.(eds.) In the Nature of the Cities. Urban Political Ecology and the Politics of Urban Metabolism. 1st ed. London and New York: Routledge, 2006. 271 pp. ISBN 978-0-415-36828-5.

[13] HRÁDEK, M. (2000): Geomorphology of the Tišnov-district. Předklášteří : Sborník Okresního muzea Brno-venkov, 2000, p. 67-84 + 7 picture suplement. (In Czech)

[14] Hydrology of Czechoslovakia, vol. III, Praha, Institute of Hydrometeorology, 1970, 305 pp. + 7 maps. (In Czech)

[15] HYNEK, A. The Politics of Landscape on Regional and Local Levels. GeoScape 1, vol.4 (2009), p.10-27. Dept.of Geography, J.E.Purkyne University in Usti nad Labem. 2009. ISSN 1802-1115, http://geo.ujep.cz.

[16] HYNEK A., SVOZIL B., TRÁVNÍČEK J., TROJAN J. Sustainability Educational Project – Case Study Deblín Rural Town, South Moravia, Czech Republic. Proceedings CD EDULEARN10 Conference 5th-7th July 2010, Barcelona, Spain. International Association of Technology, Education and Development (IATED). Edited by L. Gómez Chova, D. Martí Belenguer, I. Candel Torres. International Association of Technology, Education and Development IATED, Valencia, p. 003045 – 003054. ISBN: 978-84-613-9386-2.

[17] HYNEK A., SVOZIL B., TRÁVNÍČEK J., TROJAN J. Best Practice Example of Educational Project: Sustainability in Deblín, South Moravia, Czech Republic. In: A. Demirci, L. Chalmers, Y. Ari, J. Lidstone, eds.: Building Bridges between Cultures through Geographical Education - Proceedings of the IGU-CGE Istanbul Symposium: July 8-10, 2010, IGU Commission on Geographical Education, Fatih University, 2011, 307 pp., p.23-30. ISBN: 978-975-303-110-3

[18] HYNEK A., SVOZIL B., VÁGAI T., TRÁVNÍČEK J., TROJAN J. Sustainability in Practice. In: A.Barton, J.Douhá, eds.: Multi-Actor Learning for Sustainable Regional Development in Europe: A Handbook of Best Practice. Grosvenor House

Publishing Limited: Guildford, 2010. 343 pp., p. 215-233. ISBN 978-1-908105-33-2

[19] HYNEK, A. Field Project: Crossing the Czech and Austrian Border. HERODOT Conference: Ayvalik, Turkey, 28-31 May 2009. Theme: Celebrating Geographical Diversity. MBV Berlin Mensch und Buch Verlag, 2009, p.194-200. Donert, K., Schmeinck, D., Ari, Y., Attard, M., O'Reilly, G., eds., 340 pp. ISBN 978-3-86664-586-8.

[20] KOLEJKA J. On some imperfections in contemporary Czech landscape study and the look for way of their remedy. In Kolejka J. et al. (ed.): Czech and Slovak landscape in contemporary research. 1st ed., Masaryk University Brno, p.78-96, 2011, 342 pp.,. ISBN 978-80-210-5420-2. (In Czech)

[21] KUBALÍKOVÁ, L. Geomorphology of the Deblin-highland. Thesis, Brno: Dept. of Geography, Fac.Sci., Masaryk University, 2005. 83 pp. + supplement.

[22] PLÍVA, K. Typological classiffication systém of IFEM. Brandýs n.L.: IFEM, 1987, 52 pp.

[23] PREOBRAZHENSKIY, V. S. Trends of development of landscape ecology in the USSR. In Brandt J., Agger P. (eds.): Methodology in landscape ecological research and planning, vol. V, Supplementary volume, Proceedings of the first international seminar of the IALE organized at Roskilde University Centre, October 15-19 1984 Roskilde, 1984, p. 17-27. ISBN 87-88183-24-6.

[24] QUITT, E. General and detailed topoclimatic mapping for purposes of environment protection. Moravian Geographical Reports, Brno: Institute of Geonics, No.1-2, 1994, p. 39-53. ISSN 12110-8812.

[25] QUITT E. (1987): Topoclimatic map of the ČSR 1:50 000, sheet 24-32 Brno, 1987. Collection of geographical map of the environment. Brno: Geografický ústav ČSAV.

[26] SPIRIDONOV, A. Geomorphological mapping. Moskva: Nědra, 1975. 184 pp.

[27] SVOZIL, B., HYNEK, A. (eds.). The Deblin-locality: on the road to sustainability: Homeland study textbook, 1st ed. Deblín: Basic and nursery school Deblín. 2011. 267 pp. ISBN: 978-80-260-0164-5.

[28] TROJAN, J., TRÁVNÍČEK, J. Atlas of Deblin-locality. 1st ed. Brno: GEODIS BRNO, ltd. 2011. 78 pp. ISBN: 978-80-87473-00-9.

[29] WYLIE, J. Landscape. 1st ed. London and New York: Routledge, 2007. 246 pp. ISBN 10-0-415-34144-8.

Deblínsko: přírodní krajina

V rámci mezinárodního projektu LENSUS bylo zvoleno Deblínsko za pilotní území pro výchovu k trvalé udržitelnosti. Projekt zahrnoval i studium přírodní krajiny založené na analýze mapových podkladů a terénním průzkumu. Podařilo se zkonstruovat i mapu fyzickogeografických celků intenzivními výzkumnými metodami a zaměřit se na studium materiality přírodních krajinných prostorových jednotek. Rovněž intenzivní sociální výzkum přinesl pozoruhodné výsledky spoluprací univerzity a základní školy, kdy rodiny žáků projevily nebývalý zájem o téma trvalé udržitelnosti, a komunita žije tímto projektem. Rodiče byli překvapeni a přivítali výsledky studia pro svůj život.

CHANGES OF THE CITY OF POPRAD FROM THE POINT OF VIEW OF LANDSCAPE STRUCTURE

Vladimír Solár

Department of Geography and Regional Development

17. novembra 1, 081 16 Prešov

solar.vladimir@gmail.com

Abstract: *The city of Poprad has held a very significant, central position in terms of settlement structure of the Poprad basin or the greater region beneath the High Tatras from the very beginnings of its development. The area demarcated by the current cadastre limits was witness to many changes to the landscape structure conditioned by a wide range of factors and conditions, out of which human involvement appears to be the most significant one. It is the aim of the paper to clarify the trends in development of the landscape structure of the Poprad cadastre area. In terms of chronology, the development of the landscape structure is, in connection with relevant cartographic documentation, limited to the years 1782 – 2007. The knowledge of past and present trends in the development of landscape structure is a determining factor for any further development, even from an environmental point of view.*

Key words: *landscape structure, changes, development*

INTRODUCTION

The paper builds on the fact that in the significant city which Poprad surely is, there must have been some significant administrative, natural and especially cultural- historical changes taking place in the period of interest, pertaining to the make-up of the landscape structure. The central position in terms of the Poprad river basin and the close proximity of the High Tatras mountains

exhibit a significant influence on its dynamics, including even the changes in the landscape elements themselves. The mapping of the elements of the landscape structure belonging to the selected time period is one of the elementary methods of research of landscape structure in terms of the LANDEP methodology (Ružička, Miklós, 1982). The environment of a geographic information systems (GIS), more specifically the proprietary software Arc View, creates a suitable environment for the processing and evaluation of landscape structure, as presented in works by Boltižiar (2007), Ivanová (2006), Olah, Boltižiar, Petrovič (2006), and others.

METHODOLOGY

The area of research is demarcated by the current cardastre limits of the city of Poprad. It was created by a continuous merging of the autonomous administrative units of Poprad, Matejovce, Spišská Sobota, Stráže and Veľká. The demarcated region spreads over an area of 6 293 ha. The analysis of the area of the city of Poprad makes use of the analysis of elements of secondary landscape structure in terms of the LANDEP methodology (Ružička, 2000). In order to capture the dynamics of the landscape structure, the individual elements are divided into eight groups: 1 Group of elements of forest and non-forest vegetation, 2 Group of elements of permanent grassland, 3 Group of elements of agricultural crops, 4 Group of elements of subsoil and substrate, 5 Group of elements of rivers and water areas, 6 Group of settlements and recreation areas, 7 Group of technical elements, 8 Group of transportation elements. The elements were identified with the use of analogue interpretation of cartographic documentation from six temporal horizons, chosen depending on their availability (1782, 1882, 1877, 1956, 1986, 2007). Digital vector processing of the maps was performed using the Arc View 10 software base, where each polygon was assigned a numeric and verbal attribute. Subsequently, area quotients of landscape element groups in the respective temporal horizons were evaluated and compared.

RESULTS

The area of the city of Poprad in the 1782 temporal horizon exhibited 24 landscape elements in six elementary groups, with a the largest area quotient of 4584,87 ha in the third group of elements of agricultural cultures. The lowest area was made up of the elements of the fifth group – water courses and surfaces. In the latest and most current temporal horizon of 2007, 61 landscape elements in eight groups were identified. The largest area of 3501, 73 ha was taken up by the third group of elements of agricultural cultures and, on the

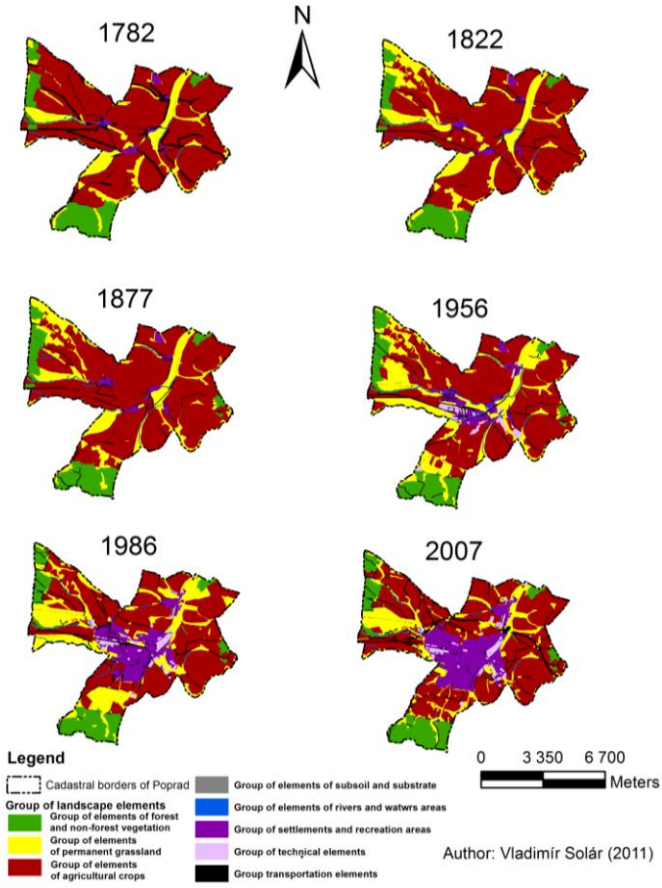
other hand, the lowest area was take up by the elements of the fourth group – subsoil and substrate. A complex view of the area division of groups of landscape elements in terms of the researched temporal horizons is presented in Table 1. Map 1 demonstrates the spatial placement and proportional representation of the individual groups of landscape elements in a chronological order.

Tab. 1: Spatial rates of the groups of landscape elements

Group of landscape elements	Area in ha 1782	Area in ha 1822	Area in ha 1877	Area in ha 1956	Area in ha 1986	Area in ha 2007
1	703,74	662,11	766,68	768,88	744,17	777,32
2	795,79	1104,90	1002,82	1462,42	1279,10	674,28
3	4594,84	4312,92	4279,45	3481,16	3225,09	3501,73
4	0	0	0	1,25	1,25	3,40
5	24,02	24,88	24,88	24,49	24,41	24,43
6	112,58	118,13	130,46	291,24	605,35	732,70
7	0	0	0,33	147,67	208,66	240,24
8	62,04	70,07	88,38	115,89	204,97	338,90
Together	6293	6293	6293	6293	6293	6293

Source: Vladimír Solár (2011)

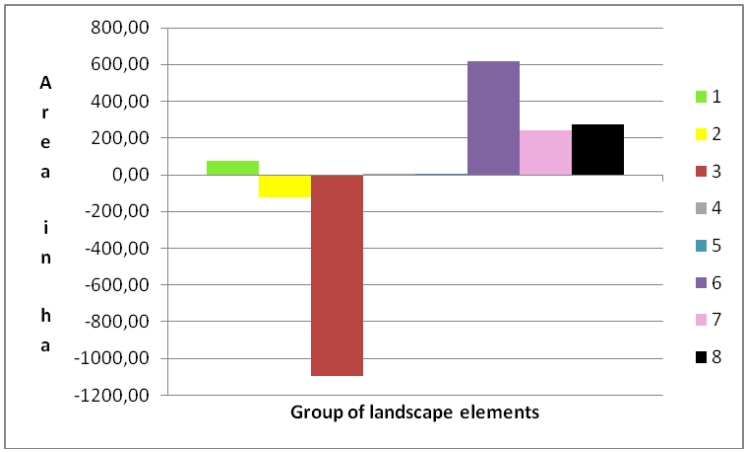
In terms of the researched timespan of 225 years, the landscape structure of the area has changed significantly, or let us say that the proportional representation of the landscape elements has changed. The largest decrease of 1093,11 ha was present in the third group of elements of agricultural cultures (Graph 1).



Map 1: Changes of landscape structure of Poprad city
Source: Vladimír Solár (2011)

Significant increase of 620,12 ha of land was recorder within the sixth group of settlement elements and recreational facilities, within the eight group or elements of transportation (276,86 ha) and the group of technological elements (240,24 ha). Apart from the elements of the water courses and surfaces group, the most stable areas include elements of coniferous forests situated in the western part of the area and elements of large-scale fields in the south-west. The proportion of natural elements (groups 1–5) to other elements created by man (groups 6–8) was, in the year 1782, calculated as 35:1 or 97,23% to 2,77%

in respect to the total and in the year 2007 as 3,8:1 or 79,15% to 20,85%, which indicates an almost eight-fold increase.



Graph 1: Changes in the groups of landscape elements from 1782–2007
Source: Vladimír Solár (2011)

CONCLUSION

According to Lipský (2002), the observation and detailed evaluation of the historical development of an area is one of the elementary steps in solving current landscape-ecological problems. In terms of the aim, trends in the development of the landscape structure of the cadastre area of the city of Poprad were analysed and clarified. In the last 225 years, the cadastre area of the city of Poprad went through apparent changes in the landscape structure. It was especially the connection of the city to the main traffic lines towards the end of the 19th century that fuelled the development of industry and the subsequent construction of settlements, which caused the rapid decrease in agricultural land and a slight decrease in the area of grass overgrowths. The other groups of elements exhibited an increase in their area proportion, at the expense of the two previously mentioned groups. Man, by means of his activities in the course of the last 225 years, has significantly influenced the development of the landscape structure in the area of the city of Poprad, which is reflected by the proportional representation of the individual groups of landscape elements.

Príspevok je súčasťou grantového projektu VEGA č. 1/0451/10 Geoekologické dimenzie vybraných environmentálnych záťaží v Slovenskej republike. Vedúci projektu: Prof. RNDr. Eva Michaeli, PhD.

REFERENCES

[1] BOLTIŽIAR, M. 2007 Štruktúra vysokohorskej krajiny Tatier. FPV UKF v Nitre, edícia Prírodovedec č. 280, 248 p.

[2] IVANOVÁ, M. 2006 Zmeny v krajinnej štruktúre podvihorlatských obcí Vinné, Kaluža, Klokočov, Kusín a Jovsa. In: Geografická revue Katedra geografie Fakulty Prírodných vied Univerzity Mateja Bela v Banskej Bystrici, Roč. 2, č. 2, p. 130-134, ISSN 1336-7072.

[3] LIPSKÝ, Z. 2002 Sledování historického vývoje krajinné struktury s využitím starých map. In: Němec, J., (ed.) Krajina 2002 od poznání k integraci. Ministerstvo životního prostředí, Ústí nad Labem, p. 44-48.

[4] OLAH, B., BOLTIŽIAR, M., PETROVIČ, F. 2006. Land use changes' relation to georelief and distance in the East Carpathians Biosphere Reserve. In: Ekológia (Bratislava) Vol. 25, Nr. 1, p. 68-81.

[5] RUŽIČKA, M. 2000 Krajinnoekologické plánovanie – LANDEP I. Vydavateľstvo Biosféra, Bratislava, 120 p.

[6] RUŽIČKA, M., MIKLÓS, L. 1982 Landscape ecological planning (LANDEP) in the process of territorial planning. In: Ekológia – ČSSR Nr. 1, Vol. 3. Bratislava: ÚKE SAV, 1982, p. 297–312

Proměny města Poprad z aspektu krajinné struktury

Město Poprad tvoří centrum Popradské kotliny. V krajinné struktuře na území města Poprad probíhaly ve sledovaném období r. 1782-2007 neustálé změny. Nejmarkantnější jsou tyto změny patrné na úbytku plochy ve skupině zemědělských kultur. Dlouhodobý růst dosahovaly během celého období skupiny sídelních prvků a rekreačních prostorov, technických prvků i prvků dopravy. Celkový podíl přírodní složky v rámci krajinné struktury poklesl během sledovaného období o 18,08%. Stabilní část území v celém období tvořil jižní okraj katastrálního území města Poprad s prvky jehličnatých lesů. Za celé období stoupl počet krajinných prvků z 24 v r. 1782 na 61 v r. 2007. Poznání trendů vývoje krajinné struktury je důležité z hlediska predikce a trvalé udržitelnosti předmětného území.

TYPOLOGY OF POST-INDUSTRIAL LANDSCAPE IN ÚSTÍ REGION

Jaromír Kolejka[1], Martin Klimánek[2]

[1] Institute of Geonics, Academy of Sciences of the Czech Republic, Department of Environmental Geography, Drobného 28, CZ-60200 Brno, Czech Republic, kolejka@geonika.cz

[2] Mendel University, Faculty of Forestry and Wood Technology, Department of Geoinformation Technologies, Zemědělská 1, CZ-61300 Brno, klimanek@mendelu.cz

Abstract: *The location, mapping and typology of post-industrial landscapes (PIL) are the most common requirements of planners and decision makers on all levels of administration or resolution. Data on industrial heritage was applied for the identification and typology of the post-industrial landscapes on the regional level on the example of the Usti Region in the North of the Czech Republic. This Region was presumably the most industrialized territory in the country and was significantly changed after the structural changes in regional economy. The industrial heritage is represented by objects and traces in any landscape left by the industry in the previous period which is not serving the present industrial activities. Accessible data sources on man-made land, land use, brownfields, undermined sites, contaminated sites, industrial architectural heritage, etc. were applied to identify and classify the post-industrial landscape (PIL) in the study region using GIS technology.*

Key words: *GIS, Ústí Region, PIL indicators, commonly accessible data sources*

INTRODUCTION

Industry has been changing the landscape character of developed industrial countries, including Czech lands since 18th century. Maximum industrial development was connected with the development of manufactures and introduction of the steam engine into production, especially in the second half of 19th century. Economic crises in 1920s and 1930s changed the structure of industrial production and post-war industrial restoration in the late 1940s and early 1950s was focused on armament, mechanical engineering and petrochemical industries. Starting from the 1970s, the industrial restructuralizing focused on the automotive, electrical and chemical industries led to the computerization and robotic automation of production and to energy, material and personnel savings, sometime respecting environmental issues. Digression from heavy industry and labour-intensive production after political changes in the late 1980s was accompanied with painful and not always successful transition to different types of production. This in turn led to the collapse of most major mining, smelting and processing companies and lost jobs were only partially retrieved. Concentrations of abandoned industrial and

industry related objects led to the origin of the post-industrial landscape (PIL). Post-industrial landscape, i.e. a landscape which has been initialized, created, affected and finally abandoned by industry, has attracted profound interest of experts from a wide range of fields. Especially, individual industrial objects and/or areas directly related to past industrial activities are typical representative landmarks of such kind of landscape, common not only in the classical industrial countries. Traditionally, most attention is paid to the architectural, social and environmental aspects of individual industrial heritage objects and their sets. A number of industrial cities opted for revitalization of originally industrial areas and accompanying residential districts with the primary objective of transforming them into modern residential and service areas with high standard facilities. The most important concentrations of various objects of a direct or indirect industrial heritage (inherited from the industrial age – app. from the end of 18th century to middle 1960s) form a special landscape view which determined a post-industrial landscape. Landscapes initially created and now abandoned by industries are characterized by a number of specific physiognomic, structural and functional attributes which represent relics of the past industrial era. While "recent" in functional industrial landscapes, these characteristics are "fossil" in post-industrial landscapes. Definition, classification and typology of post-industrial landscapes of the Ústí Region in the Czech Republic is also the main aim of the grant project "The Fate of Czech Post-Industrial Landscape" number IAA 300860903 supported by the Grant Agency of the Academy of Sciences of the Czech Republic (for years 2009-2011).

FEATURES OF THE POST-INDUSTRIAL LANDSCAPE

The existence of post-industrial landscape is a generally accepted fact of the contemporary world. However, its scientific research still fails to meet requirements. In all probability, the primary research initiative can be accredited to architects studying industrial heritage buildings. Historical industrial architecture has been attracting the attention of professionals due to rapid structural changes in western industrial economies since the 1970s. While individual industrial objects represent interesting subjects both of public and scientific interests, a significantly less attention is paid to wider areas of industrial heritage. The post-industrial landscape has so far failed to secure a firm position in the focus of experts and as such remains in the sphere of popularization. The relations between industrial heritage and the landscape are still subject to less intensive studies but interest in this issue is growing promisingly. Needless to say that even abroad it is initiated primarily by architects (e.g. the newly established Department of Landscape Architecture

and Industrial Landscape at the Munich University of Technology in 2009). In the Czech Republic, a certain link can be traced in the work of the Institute of Industrial Landscape Ecology of the Czechoslovak Academy of Sciences which operated in Ostrava in the 1970s and 1980s. Although the term "post-industrial landscape" has become frequent in specialized literature at the turn of century and various measures concerning its future are seriously considered, its geographical definition (delimitation and content) remains vague and indefinite (see Loures, 2008). Traditionally, architectural (Cashen, 2006), economic (Shahid, Nabeshima, 2005, Dunham-Jones, 2007) and social aspects (Kirkwood, 2001, Kirk, 2003) of this type of landscape have been the dominant focus of their studies (in the geographic context). Landscape science deals with its ecological aspects, particularly focusing on the occurrence of biotic communities and species (Kirkwood, 2001, Keil, 2005), possibly also environmental ones (soil and water remediation). With a few exceptions abroad, the issue of post-industrial landscape remains to be elaborated descriptively in cases of individual studied areas. Yet, the descriptive aspect of research is vital, as it turned out necessary in cases of conservation and integration of remaining industrial landscape heritage into territorial planning documents.

The description of post-industrial landscape attributes may be related to individual structures of the contemporary cultural landscape. These structures affect one another strongly in the contemporary landscape, which means that changes in one of them tend to trigger changes in the remaining structures. All the structures demonstrate logical territorial differentiation of the landscape's building components. Detailed descriptions of these structures and their characteristics in a post-industrial landscape are listed below:

1) Natural (primary) structure: changes in the topoclimate, drainage relations, soil removal or coverage, terrain changes, changes in contact with the geological environment, radical changes in the biota.

2) Economic (secondary) structure: land use is characteristic of dominant production facilities with typical buildings, vast communication areas, active and passive mining areas, water management facilities, surrounding dense residential and service built-up areas. These parameters are "recent" in the industrial landscape, while the post-industrial landscape is characteristic of a number of features, among them "fossil" ones as accented above.

3) Human (social, tertiary) structure: a change in stakeholder interests is manifested by devastated and later abandoned areas, deterioration and loss of the above mentioned industrial buildings' original function due to neglected maintenance. On the other hand, some buildings are subject to various degrees

of protection. A number of residents faced changes in social standing. In some cases this social status change led to emigration or immigration.

4) Spiritual (quaternary) structure: both local residents and visitors perceive the landscape differently. This change is partly due to political as well as economic and social changes, and due to better access to information on the environment, different access to power and power structures. Some places show indisputable genius loci.

The aims of the paper are to demonstrate the possibilities of identification, mapping, classification and typology of post-industrial landscape on the example of the Ústí Region of the Czech Republic, one of the most industrialized region of the country with deep structural changes in the two last decades and thus demonstrate utilization of available data depicting the industrial heritage in all the landscape structures. The application of GIS processing technologies for the purposes of objective delineation on this type of landscape is unavoidable to allow future administrative decision making, territorial planning as well as gain deeper scientific knowledge. Theoretically, it is possible to distinguish "urban" and "rural" post-industrial landscapes regardless the industrial revolution and industrializing in general is linked with towns. Only in "rural" areas, the industrial heritage can dominate the landscape view, thus there only the post-industrial landscape represents a full reality.

DATA PROCESSING

The Ústí Region is situated in the north-west of the Czech Republic at the border with Germany. It covers 5 335 km^2 and has approximately 836 000 inhabitants (in 2010). It is constituted by seven districts. The industrialization begin there in early 19^{th} century connected with the glass, textile and metal production. Large deposits of lignite in the basins below the Ore Mts. ignited the development of the machinery, energy, chemical and food industry (beer), dense railway network construction and steamboat transportation on the Elbe River. After the WW2 damages only few war glass and textile factories were reopened. The chemical and energy industry based on the open air style of coal mining were preferred by the communist government. Since mid-1980s, the gas cleaning facilities were added to the largest existing toxic gas sources. Political, social and economic changes in 1990s led to closure of inefficient enterprises and this ongoing process still persists in the Region. Many abandoned industrial buildings and areas dominate the landscape view in many territory segments. Additionally, some agricultural, military and other buildings were abandoned by their previous users.

The process of systematic research, mapping, classification and typology of post-industrial landscapes in the Ústí Region is based on the GIS technology application. Data sets suitable for the purposes of the project were obtained (Tab. 1) from different commonly accessible sources.

Tab. 1: Data sources used for identification and evaluation of post-industrial landscapes of the Ústí Region

No.	data source	source administrator	selected properties	relation to industrial heritage	implementation
1	ZABAGED – basic set of geographic data	Czech Office for Surveying, Mapping and Cadastre	1:10 000 polygons S-JTSK	mining sites, industrial sites, waste deposits, mine dumps	upon concluded generalization it is necessary to separate post-industrial sites and wrap polygon in buffer
2	CORINE Land Cover 2006	Ministry of the Environment of the Czech Republic	1:50 000 polygons WGS84 min. area 25 ha	industrial units – class 121, mineral extraction sites – class 131, dump sites – class 132	good, post-industrial sites must be separated, polygon enwrapped in buffer
3	National inventory of contaminated sites	CENIA – state organization	localization of gravity points according to coordinates obtained in field through GPS technology, S-JTSK points	chemical contaminations	buffer-enwrapped points
4	Czech brownfields catalogue	Czechinvest – state organization	approx. 1:10 000, points S-42	brownfields according to their original use, site catalogue with localization according to	buffer-enwrapped points

				settlements or addresses	
5	undermined areas	Czech Geological Survey	approx. 1:50 000 polygons and points S-JTSK (min. area 4 km^2 as area, smaller than a point)	undermined areas and points	good in sites exceeding 4 km^2, extract from the undermined areas DB, polygons and points enwrapped in buffer
6	urbanized metropolitan areas of over 50 000 inhabitants	ARC ČR 500, own interpretations of aerial photographs	built-up areas of residential, production and service character	mix of industrial and post-industrial landscape objects within dominant urbanized metropolitan landscape	utilizable as a mask for filtering areas whose landscape character is defined by the metropolis, not the industrial heritage
7	district towns	Czech Statistical Office	cadastres of district towns	enables separation of the towns' urban landscape from the remaining area	delimitation of district town areas according to a code in attribute table
8	industrial heritage buildings	Research Centre for Industrial Heritage of the Czech Technical University in Prague	GPS localization of the buildings' gravity points in an Excel table	preserved industrial architecture monuments	alongside localization, the original purpose of the building is listed

Every implemented data set required a specific approach and interpretation for the project purposes. It was necessary to formally integrate them into a shape file for further processing in GIS SW from ESRI ArcGIS 9.2 with respect to the fact that the required geodata come in various formats, cartographic projections and coordinate systems. All files were converted into the S-42 coordinate system. The system allows smooth north-south orientation of map outputs without the need to demonstrate cardinal points in maps by a compass rose. Although ArcGIS 9.2 allows simultaneous processing of geo-referenced data of different data formats, different cartographic projections and different coordinate systems, unification of all these parameters proved useful

particularly at the classification and typology stages of geo-data processing, when a unified if extensive attribute table was required.

The available and implemented data fall into two categories with regard to topology:

- point data (only geographic coordinates of the studied objects' gravity points are known): brownfields, old chemical contaminations, small-scale mining subsidence areas, industrial heritage buildings; the attached attribute table allows users to determine or to extrapolate data on the type of the object, its origin and possibly also its size),
- polygon data (geographic coordinates describe refractive points of the objects' borders): industrial areas, mining and waste sites, human made mining land forms, outlines of towns exceeding 50,000 inhabitants and of district towns cadastres; the attached attribute table allows users to determine data on the objects' type, origin and others.

It is obvious that concentrations of relevant point objects and their possible connection to polygonal objects serve as sufficient indicators of post-industrial landscapes (post-industrial areas in general). The question remains when the distance between individual point objects becomes short enough to be included in a single common area. Opinions on this matter may differ among experts of various fields. Nevertheless, points (and similarly also areas) must represent cores of potential post-industrial areas.

Interviews conducted with local residents of the elaborately studied post-industrial areas of the Czech Republic revealed a certain consensus about a acceptable distance of unpleasant objects (a minimum of 500 m). Naturally, this distance is purely subjective and without a certain degree of convention cannot be applied to the impact range of every brownfield, mining subsidence area, contaminated site, waste dump or extraction site. Without any doubt, different types of environment (geological and hydro-geological environments, terrain, surface layer of the atmosphere) will display various impact ranges and the shapes of the given environment will affect the shapes within it. A really infinite number of such combinations may occur and it is practically impossible to study individual points and areas and to delimit the impact range of a given object for every single location. For these reasons, including the uninformed opinions of people inhabiting areas around all points and areas, uniform impact zones of 500 m in width were established. These zones are represented by buffers in GIS. Industrial and commercial areas (CORINE) are exception to the rule since only areas with a minimum of one brownfield were applied into the processing as stated above. All buffer-enwrapped points and areas were then subjected to unification using by a relevant ArcGIS tool,

whenever the overlapping or at least point contact of buffer zones enabled it (Fig. 1). However, built-up areas and large towns, in this particular case of district towns and towns with a population more than 50 000, were eliminated from the obtained results, as the visual and other effects of post-industrial sites within them disappear in the mosaic of contemporary land use and their current function in the given administrative centre. Outside large towns, the universal effect of post-industrial units on the landscape cannot be disputed. In a number of cases (in places of concentration of such studied objects) the impact can be dominant, both in terms of its physiognomy and the environment.

Post-industrial landscapes defined by the existing procedure come in rather bizarre shapes as the result of connected buffer zones around individual post-industrial landscape indicator objects. The ESRI ArcGIS technology offers a tool "Simplify Polygon" which enables several generalization algorithms. The "Bend Simplify" algorithm provides the best results, as it maintains an object's shape, reduces local extreme projections of the outline of individual post-industrial landscapes and keeps area sizes of sites within new (generalized) outlines. The final classification procedure based on occurrence, share and number of object of certain origin produced the typology of the post-industrial landscapes in the Ústí Region (Fig. 2). Only areas with size more than 5 km^2 were accepted as "post-industrial landscapes" (see below).

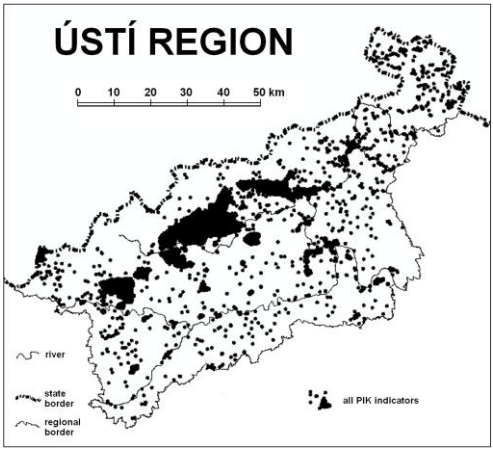


Fig. 1: All indicators of PIL with buffer

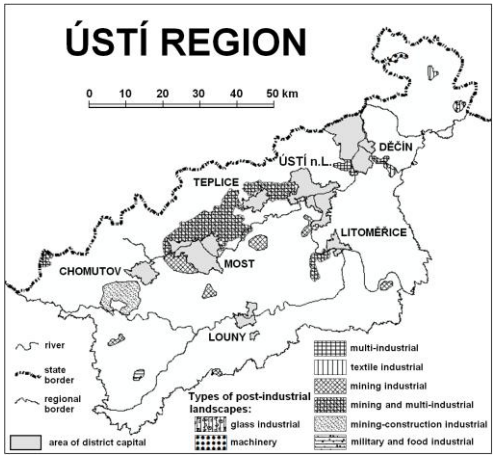


Fig. 2: Typology of postindustrial landscapes

PROCESSING PROCEDURE DISCUSSION AND CONCLUSION

The result of processing geo-data indicating post-industrial areas is a set of sites of various shapes and sizes. However, only areas exceeding a certain size can be considered post-industrial landscapes. Determining the minimum size is a subjective task which can draw on the following indices:

- the minimum differentiated area must exceed the smallest area of mining subsidence, which amounts to 4 km^2 originally, provided with a buffer,

- the most common size of cadastre within the Czech Republic (apart from the border regions and towns) is 4-6 km^2; as a norm, this area is considered the basic planning unit for territorial and landscape planning (e.g. for designing general plans of territorial systems of ecological stability),

- approximately 5 km^2 represent a commonly sized small town where post-industrial areas may play a dominant role with respect to its appearance (perception) and planning,

- the Czech Republic represents a geo-morphologically varied area whose appearance changes after approximately 1-hour-walk, which may represent roughly 5 km route generally and approximately 4-6 km^2 in wide valleys.

Although the indices selection may seem arbitrary, it still supports subjective and as such conventional selection of minimal extent for areas which could be denoted as “post-industrial landscapes”. This denotation is valid unlike the denotation of small-area sites which upon meeting the same criteria show

smaller surface and thus can be defined as "post-industrial areas", potential cores of future post-industrial landscapes, provided they are extended by inclusion of new indicator objects. Application of this conventional rule in the Ústí Region helped define post-industrial landscapes meeting the condition of a minimum 5 km^2 extent (Fig. 2).

The classification itself draws on knowledge of proportional representation of factors which played an active role in the genesis of the given post-industrial landscape. These include industrial and other activities which in the given territory left traces indicating post-industrial landscapes (see the processed data). Within the Ústí Region, most of these sites (apart from industrial-production facilities) are associated with mining activities. Upon distinct dominance of a given industrial or other activity, the said post-industrial landscape was labeled after it. If another activity was represented in a given post-industrial landscape together with a dominant one (numbers cannot be defined exactly – in a minimum of three cases), a two-word denomination was created in which the first word represents the dominant activity and the second the accompanying one. If many territorially balanced activities caused the origin of the post-industrial landscape, the label "multi-industrial" was used.

As is apparent from the outline of implemented methods and individual steps, several weak parts can be spotted in the process. The first weakness is the selection of indices and necessary data, which lack social and economic data among other things. However, these cannot be used before the stage of classification of already defined areas.

The determination of buffer zone width around every interest object can be subject to discussion. 500-meter buffers are to symbolize the given object's spatial impact on its surroundings. In this case there was no other option except to use the above-mentioned procedure. It enabled the transition of point data on area ones and thus objectify, to a certain extent, the process of finding "connected" concentrations of these points. It is not possible to individually assess the actual impact of every single point and area on their environment which offers a countless variety of shapes and sizes.

Another case of a subject entering the processing can be seen in the utilization of adopted size classification of identified areas, of which only those exceeding 5 km^2 are further classified as landscapes while the smaller ones are considered only areas. In this case references to similar size criterion were made, regardless of the fact that they do not bear a direct relation to the solved issue.

A considerable weakness is inherent in the data themselves, their geometric and semantic quality. From the perspective of the processing process itself, particularly in the CORINE LC database, it is not possible to separate all the

active and passive sites, i.e. indicators of industrial and post-industrial landscapes. Yet, the adopted procedure (in the opinion of the authors) managed to remove from further processing such sites which probably do not represent post-industrial landscape indicators, i.e. industrial areas without brownfields. However, it must be taken into consideration that the used brownfields databases is not complete and as such cannot be fully replaced with data on contaminated sites and industrial heritage objects (regardless of their high mutual spatial correlation – highly similar occurrence of point and area concentrations).

Despite the above-mentioned weaknesses, the unquestionable strengths of the adopted method must be highlighted. These lie in the possibility to replicate the procedure in other places and another time, providing that similar data are available, which is possible in developed industrial countries. A future comparison between the situations in different states and in the course of time will be possible.

Poděkování: Vymezení, klasifikace a typologie postindustriálních krajin Ústecka je součástí řešení grantového projektu „Osud české postindustriální krajiny“ číslo IAA 300860903 podporovaného Grantovou agenturou Akademie věd České republiky.

REFERENCES

[1] CASHEN, D.: Redeveloping a North Florida Post-Industrial Landscape. In: Journal of Undergraduate Research, 2007, 8 (3), URL <http://www.clas.ufl.edu/jur/200701/papers /paper_cashen.html> [cit. 2010-01-18].

[2] DUNHAM-JONES, E.: Economic Sustainability in the Post-Industrial Landscape. In: Tanzer, K. & Longoria, R. (eds.): The Green Braid. Towards an Architecture of Ecology, Economy, and Equity, An ACSA Reader, London: Routledge, 2007, pp. 44-59.

[3] KEIL, A.: Use and Perception of Post-Industrial Urban Landscapes in the Ruhr. In: Kowarik, I. & Körner, S. (eds.): Wild Urban Woodlands. Berlin-Heidelberg: Springer, 2005, pp. 117-130.

[4] KIRK, J.: Mapping the Remains of the Postindustrial Landscape. Space and Culture, 2003, Vol. 6, No. 2, pp. 178-186.

[5] KIRKWOOD, N.: Manufactured Sites. Rethinking the Post-Industrial Landscape. London: Taylor and Francis, 2001, 272 p.

[6] LOURES, L.: Industrial Heritage: the past in the future of the city. WSEAS Transactions on Environment and Development, 2008, Vol. 4, No. 8, pp. 687-696.

[7] SHAHID, Y., NABESHIMA, K.: Japan's Changing Industrial Landscape World Bank Policy Research Working Paper No. 3758, 2005, URL <http://ssrn.com/abstract=844847> [cit. 2010-01-15].

Typologie postindustriální krajiny Ústeckého kraje

Postindustriální krajina je dědictvím minulosti, avšak také zcela reálnou součástí území nejen průmyslově vyspělých zemí světa. Postindustriální krajina je předmětem výzkumu přibližně jednu dekádu a zvláště v diskusi o jejím osudu panuje značná diverzita názorů. Decizní sféra pro své potřeby potřebuje maximálně objektivní vymezení tohoto typu krajiny a její klasifikaci. V tomto příspěvku je demonstrován postup vymezování postindustriálních krajin na území Ústeckého kraje, jejich klasifikace a typizace za využití dostupných datových zdrojů a technologie GIS. Postindustriální krajina je dědictvím průmyslové revoluce. Průmyslem nejprve vytvořená a nyní opuštěná krajina se vyznačuje řadou specifických fyziognomických, strukturních a funkčních atributů, které představují relikty minulého průmyslového období. Zatímco ve fungující industriální krajině jsou tyto parametry „recentní“, v postindustriální krajině jde o charakteristiky „fosilní“. Jde o charakteristiky vztažené ke čtyřem současným krajinným strukturám (přírodní, ekonomické, humánní a duchovní). Jejich vymezování však naráží na nedostatek relevantních dat pro rozsáhlejší území umožňující klasifikaci a typologii podle zřejmých rozdílů ve vlastnostech. Ke studii na území kraje byla použita data o rozmístění brownfields, kontaminovaných míst, architektonických objektech průmyslového dědictví, těžebních bodech a plochách, montánních antropogenních tvarech reliéfu, průmyslových a skládkových areálech. Proces vlastní identifikace, mapování, klasifikace a typologie je popsán po jednotlivých krocích, které zahrnují zdůvodnění výběru dat, jejich účelovou interpretaci, integraci v GIS, konverzi pro areálové vyhodnocení (obalením bodů a ploch standardním bufferem o šířce 500 m zdůvodněným jako konvenční vzdálenost dosahu vlivu objektů na okolí) a vlastní vyhodnocení a mapování v GIS. Tímto postupem bylo na území Ústeckého kraje identifikováno několik set „areálů“ postindustriální krajiny. Plochy větší než 5 km^2 byly zdůvodněně, ale konvenčně označeny za „postindustriální krajinu“, zatímco plochy menší za iniciální „postindustriální areály“. Území splňující toto velikostní kritérium byly podrobeny klasifikaci podle plošného a početního podílu aktivit, které vznik konkrétní postindustriální krajiny zapříčinily. Tímto způsobem bylo v Ústeckém kraji rozlišeno celkem 18 postindustriálních krajin 8 typů. Každý typ je popsán tou průmyslovou či doprovodnou aktivitou, která území formovala. Pro lepší představu o fyziognomii jednotlivých postindustriálních krajin byly tyto zasazeny do rámce geografické polohy a do reliéfu, který v podmínkách kraje zásadně ovlivňuje nejen vzhled krajiny, ale také veškeré procesy v ní probíhající.

THE EFFECT OF MINING ON THE LANDSCAPE OF SILESIAN OSTRAVA IN THE 19TH AND 20TH CENTURIES

Monika Mulková[1], Petr Popelka[2], Renata Popelková[1]

[1] Department of Physical Geography and Geoecology, Faculty of Science, University of Ostrava, Chittussiho 10, Ostrava – Slezská Ostrava, Czech Republic, Monika.Mulkova@osu.cz , Renata.Popelkova@osu.cz

[2] Department of History, Faculty of Arts, University of Ostrava, Reální 5, Ostrava, Czech Republic, Petr.Popelka@osu.cz

Abstract: *This case study brings an analysis of the effect of the industrialization process on the landscape of the western part of the Ostrava-Karviná Mining District. Silesian Ostrava, which the authors focus on, is related to the origins of mining in the Ostrava Region. A majority of local inhabitants were employed in mining industry as early as the first half of the 19th century. This period is also associated with the first mine damages and considerable impact of increasing mining activity on land use. The mining activity of the 20th century reached such an extent that it endangered the existence of Silesian Ostrava as a settlement unit.*

The landscape development of Silesian Ostrava was analyzed using data derived from stable cadastre maps (1836) and aerial photos for years 1949, 1964, 1985 and 2009. Basic data were completed with information obtained from printed sources and archival written sources. The study constitutes a part of a wider project dealing with the research of historic landscape development in the Ostrava-Karviná Mining District in the 19th and 20th centuries.

Key words: *landscape development, landscape processes, land cover, aerial photo, Silesian Ostrava, black coal mining*

INTRODUCTION

The period of the last two centuries has witnessed key transformation processes that turned a traditional agrarian society into a modern industrial society. According to many historians, these major changes were triggered by the so-called Double Revolution (Doppelrevolution). The first 'revolution' corresponds to social changes provoked by the ideas of the Enlightenment that resulted in the transformation of a traditional society of the Estates into a society built on the principle of formal equality, liberalism and liberty. The second 'revolution' is then represented by the Industrial Revolution which not only brought key changes to the manufacturing process and the society itself, but it radically transformed the dependence of man on the nature in the first place. It was the Industrial Revolution (the first phase of a wider process of

industrialization) that brought the most fundamental change into the existence of man that has ever been recorded in written sources.

The number of industrialization-generated changes, whose impact was of cardinal importance, was very high. The society underwent transformation in terms of technology, economy, social structure and culture. At the same time, industrialization changed significantly the interaction of man and nature, which reflected itself in important landscape and land use changes. Particularly extensive land use changes took place in industrialization centres of the 19th and 20th centuries.

The submitted study presents concrete cases of the impact of the industrialization process on a specific landscape type. Attention is concentrated on originally agricultural landscape that became affected by intensive extraction of raw materials in the 19th and 20th centuries. The area of Silesian Ostrava analyzed in this study belongs to territories displaying relatively high dynamics of anthropogenically induced landscape changes in hard coal deep mining areas. It is then an area which the industrialization process affected both highly intensively and specifically.

AREA OF INTEREST

Silesian (also called Polish by the year 1919) Ostrava is closely related to the beginning of coal mining in the Ostrava-Karviná Mining District in the last third of the 18th century. Mining activity maintained limited quantities until the 1930s. An increase in coal mining starting in the 1930s reacted to the commencement of coal deliveries for newly founded Ironworks in Vítkovice. Subsequent massive increase in mining reflected both the development of heavy industry in the Ostrava Region as well as the construction of quality transport infrastructure alleviating the transport situation (particularly by means of the Emperor Ferdinand Northern Railway) (Myška, 1984).

At the turn of the 18th and the 19th centuries the then Polish Ostrava constituted a centre of the dominion of the same name. However, the village itself was one of many small villages occupying the borderlands of Moravia, Silesia and Prussia (Kneifel, 1804). During the first half of the 19th century this small agricultural village started to change into an important industrial centre. In the 1840s coal mining came to be the most sought-after livelihood option for many local inhabitants, which was also facilitated by property conditions. A majority of land was owned by noble estate manors, while liege land became gradually divided into small patches within inheritance proceedings, which led to the lack of economic self-sufficiency of the subjects (Land Archives in Opava, Stable Cadastre of Silesia). As early as the 1840s

Silesian Ostrava belonged to the most developed industrial municipalities of then emerging Ostrava-Karviná Mining District.

The second half of the 19th century was characterized by great changes in local settlement structure and land use. The cadastre became home of many miners (e.g. Counts of Wilczek, owners of the estate manor; Counts of Salm; Josef Zwierzina; Austrian state and the Rothschilds) who managed to concentrate originally dispersed mining activity into modern equipped mines. At the beginning of the 1860s annual mining volume exceeded 300 000 tons, in the mid-1890s it amounted to 1.5 mil. tons and just before an economic crisis it reached up to 1.6 mil. tons. (Matějček, Klát, Zářický, A., 2003; Jiřík et al., 1993)

Rapid development of mining activity was accompanied by a considerable increase in the population as well as changes in built-up areas. If less than one thousand people lived in the studied area in early-1840s, the first census of 1869 counted more than 4 600 people and the census of 1880 revealed that the number of inhabitants had more than doubled. Just before the WWI this number reached its historic maximum of almost 23 000 people (Jiřík et al., 1993). The influx of new inhabitants entailed extensive construction of new accommodation facilities, which manifested itself in building density. The miners made efforts to stabilize the number of workers employed in their companies by constructing mining colonies that subsequently turned into typical built-up area of Polish Ostrava. (Barcuch, Rohlová, 1999).

Mining activity affected the landscape of Silesian Ostrava in many ways. In 1840 the effects of undermining in Polish Ostrava and other parts of the Ostrava-Karviná Mining District were still relatively small. However, as a result of increased mining activity, they began to be perceived more intensively from the 1850s (Myška, 1984; Matějček, 1993). It was also in the 1850s when mining offices dealt with the first actions for mine damage (Land Archives in Opava, District Mining Office of Moravian Ostrava). In the last quarter of the 19th century mining activity strongly affected especially agricultural land in the southern part of the Polish Ostrava cadastre (Myška, 1984). Intensive mining endangered the built-up area, particularly the area of the historic village. Subsequently, the 20th century brought great changes into the built-up area that involved gradual disappearance of the original settlement and its relocation into an area unintended for mining.

DATA SOURCES AND DATA PROCESSING

Land cover (LC) of the studied cadastral area was analyzed using data from years 1836, 1949, 1964, 1985 and 2009. Land cover of 1836 was derived from stable cadastre maps obtained in the Central Archives of Surveying, Mapping

and Cadastre in Prague. Land cover in years 1949, 1964 and 1985 was studied using contact copies of black-and-white aerial photos provided by the Military Geography and Hydrometeorology Office in Dobruška. The year 2009 was analyzed on the basis of a coloured orthophoto visualized making use of the map service of the Portal of the Public Administration of the Czech Republic (PVS ČR, 2011).

Stable cadastre maps and aerial photos were transformed into the S-JTSK coordinate system using polynomial transformation. The analysis of the study area land cover situation in years 1949, 1965 and 1985 made use of data processed in Diploma Theses (Pavlíková, 2009 and Begešová, 2010). Landscape structure was identified by means of visual photointerpretation of aerial photos and visual interpretation of cadastral maps. Land cover categorization was derived from the CORINE Land Cover Legend that had been modified for large scale mapping (Feranec, Oťaheľ, 2001; EEA, 2005). Detailed methodology is presented in Mulková, Popelka, Popelková (2010).

Land cover analysis was further used to determine processes (pressures) within the study area. Processes that take place in the landscape and thus participate in its transformation play a primary role from the point of landscape change research. The research comprised five major processes identified in the studied territory based on Biopress methodology (Biopress, 2008) which were completed with another process related to undermined areas, namely flooding (more in Mulková, Popelka, Popelková, 2010).

Tab. 1: Processes taking place in the study area and their character (with an arrow indicating the change direction)

Pressure	Direction of land cover category change
Urbanization	Agricultural areas, natural and semi-natural areas, water bodies → urban fabric
Intensive agriculture	Urban fabric, fruit trees and berry plantations, pastures, complex cultivation patterns, natural and semi-natural areas, water bodies → arable land
Forestation	Urban fabric, agricultural areas, trees, scrub and/or herbaceous vegetation associations, water bodies → forests
Deforestation	Forests → urban fabric, agricultural areas, trees, scrub and/or herbaceous vegetation associations, water bodies
Abandonment	Urban fabric, agricultural areas, forests, water bodies → trees, scrub and/or herbaceous vegetation associations
Flooding	Urban fabric, agricultural areas, natural and semi-natural areas → water bodies

RESULTS

LAND COVER DEVELOPMENT

As for the year 1836, Silesian Ostrava was mainly covered by agricultural land, arable land of which occupied 41 %, and forests (38.5 %). The third most represented land cover category comprised pastures (11.4 %). Significant landscape elements were also ponds whose proportional representation was 4.3 %. These were particularly 3 ponds in the southern part of Silesian Ostrava, the largest of which was Zárubek pond. Water bodies were represented by Ostravice and Lučina streams. The percentage of built-up area showed the smallest proportional representation (1.2 %). The area shows the first industrial activities in the first half of the 19th century. Three coal mines, a small tannery and a brick factory operated in Silesian Ostrava as early as the 1840s; however, no stable cadastre maps reflect their existence. As for the year 1949, agricultural land occupied 46.6 % of the total area, whereas 32.9 % corresponded to complex cultivation patterns and 13.7 % to arable land. A significant decrease was recorded in the category of forests whose extent diminished by 390.85 ha to 5.9 % of the total area. A new category is identified, namely that of trees, scrub and/or herbaceous vegetation associations (12.1 %). A significant increase, as compared to 1836, is observed in the category of discontinuous urban fabric (9.7 %) and continuous urban fabric (8 %). Continuous urban fabric was represented especially by mining colonies: Jakubská, Jubilejní, Hranečník, Na Salmě, Hermenegild, Na Vilémce, Hladnov, Bunčák, Zwierzina, Josefská, Františkov, Jaklovec and Kamenec. Increasing black coal mining activities were connected with the appearance of mining-related LC categories which altogether occupied 10.2 % of the total area with the largest share resting in the category of Mineral extraction sites (4.2 %) and Waste banks (4.4 %). Undermining of the locality reflected in the formation of Submerged ground subsidences the extent of which made 7.89 ha (0.7% of the total area). Almost no ponds existed in 1949 as their extent decreased from the original 51 ha in 1836 to 0.31 ha. Industrial development produced an increase in the category of Road and rail network and associated land from 0.5 % to 4.2 %.

Industrial development of Silesian Ostrava reflected even more in the local landscape structure in 1964 when agricultural land decreased from 46.6 % to 14.8 %. A considerable decrease was also observed in the category of Complex cultivation patterns (from 32.9 % to 3.6 %). A slight decrease was recorded in the category of Arable land that occupied 10.9 % of the study area in 1964. On the other hand, an increase from 10.2 % to 22 % concerned mining-related LC categories, the largest part of which is represented by Waste banks (13.9 %) and Mineral extraction sites (4 %) whose extent decreased moderately in comparison with the year 1949. An increase was also related to the category of

submerged ground subsidence (1.1 %) and Tailings ponds (0.9 %). The highest proportional representation can be observed in the category of urban fabric (25.3 %), 17 % of which is represented by discontinuous urban fabric and 8.3 % by continuous urban fabric. There is an apparent increase in the category of Trees, scrub and/or herbaceous vegetation associations occupying 18.7 % of the total area.

In 1985 the largest area is occupied by natural and semi-natural areas: forests (13.3 %) and trees, scrub and/or herbaceous vegetation associations (20.5 %). The second most represented category is urban fabric whose percentage dropped slightly to 22.4 %, 15.5 % of which is discontinuous urban fabric and 6.9 % continuous urban fabric. A drop to 15.7 % was recorded in the extent of mining areas that was the highest in 1964 (22 %). The highest representation is further observed in waste banks (9.7 %), mineral extraction sites (2.1 %). A new category identified in connection with the year 1985 is that of Dry tailings ponds (0.3 %). A moderate decrease is observed in submerged ground subsidences and tailings ponds.

The year 2009 shows an evident increase in the category of natural and semi-natural areas (42.3 %). Forests also displayed an increase in percentual share in the studied locality total area (23.5 %). A slight decrease was recorded in the category of trees, scrub and/or herbaceous vegetation associations, whose share in Silesian Ostrava total area made 18.9 %. A slight decrease is also related to urban fabric whose proportional representation is 22 %, 5.9 % of which corresponds to continuous urban fabric and 16.1 % to discontinuous urban fabric. Reduction of the extent of continuous urban fabric was connected with the demolition of mining colonies, whereas an increase in discontinuous urban fabric corresponds to expanding built-up areas for detached houses. Mining-related areas show a drop in percentual representation to 3%. They are represented by reclamation areas of Zárubek mine and presently unused tailings ponds. In connection with black coal mining in decline in the early-1990s no mineral extraction sites could be found in Silesian Ostrava in 2009. If waste banks were identified in 4.7 % of the area, these were waste banks of the Steelworks of Arcelor Mittal Ostrava a.s. No submerged ground subsidences were observed. The extent of tailings ponds is minimal (0.3 % of the total area, i.e. less then 4 ha). Unlike the year 1985, transport infrastructure was observed as extended in 2009 as it occupied 7.5 % of the Silesian Ostrava total area. There was also an increase in the category of industrial and commercial units (7.3 %), which was connected mainly with the transformation of black coal mining areas into industrial and commercial units. Green urban areas of 2009 occupied the largest area in their history. Compared to previous years, there was an ongoing decline in agricultural areas to 2.4 % with prevailing category of Arable land (2.1 %). No complex cultivation patterns were identified in the

landscape. Percentual share of selected united categories in the total cadastre area in individual years is given in Tab. 2.

Tab. 2: Percentual share of selected united categories in the total area of the Silesian Ostrava cadastre

Land cover categories	Percentual share in %				
	1836	**1949**	**1964**	**1985**	**2009**
Urban fabric	1.2	17.7	25.4	22.4	22.1
Agricultural areas	53.7	46.5	14.8	6.9	2.4
Natural and semi-natural areas	38.5	18.0	22.7	33.8	42.3
Mining conditioned areas	0	10.2	22.0	15.7	3.1
Water bodies and streams	5.5	1.5	1.5	0.9	0.8

SELECTED LOCALITY PROCESSES

Processes (pressures) taking place in the area of interest were studied on the basis of overlap analysis of individual LC categories carried out for the periods of 1836–1949, 1949–1964, 1964–1985 and 1985–2009. Total changes in the area of given processes and their percentual share in the total studied territory are summarized in Tab. 3. Obtained results make it possible to make the following conclusions. The urbanization processes dominated in the period of 1836–1949 (31.5% share in the total area). Just a slight decline in urban fabric was recorded in the period of 1949-1964 (29 %). Urbanization was minimal in 1985–2009 (7.4% share in the total area). Forestation reached highest figures in the periods of 1985–2009 (10.9 %) and 1964–1985 (9.7 %). On the other hand, no forestation activities were related with the period 1836-1949 when deforestation fully manifested itself (32.7 %). The share of deforested areas is minimal in the periods of 1964-1985 and 1985-2009. The process of abandonment dominated especially in the periods of 1964–1985 (14.5 %) and 1949-1964 (13.9 %). Intensive agriculture, i.e. the transformation of all areas into arable land, took place predominantly in the period of 1836–1949, namely on 7 % of the total area of interest. Intensive agriculture was also closely connected with land consolidation starting in the 1940s. However, by 1964 a majority of agricultural land had gradually ceased to exist and therefore the process of intensive agriculture manifested itself only negligibly in the following period. An important role was played by flooding, even though it was minimal in comparison with other studied processes. Flooding, which represented a frequent display of deep mining in the landscape, was

accompanied by the formation of submerged ground subsidences and tailings ponds, particularly in the period of 1949–1964 (2.3% share). On the other hand, its lowest values were recorded in the period of 1985–2009.

Important landscape transformations are thus generally related especially with the period of 1836–1949 when the above-mentioned processes transformed 66.4 % of the total area. It was a period during which the industrialization process contributed to radical changes in the land use character within the studied territory. Important changes continued until the mid-1980s when more than 50% of the total was transformed.

Tab. 3: Total transformed areas due to pressures in the landscape and their percentual share in the total studied area in all studied periods

Process	1836–1949		1949–1964		1964–1985		1985–2009	
	ha	%	ha	%	ha	%	ha	%
Forestation	0.13	0.01	18.83	1.6	116.34	9.7	130.76	10.9
Deforestation*	390.98	32.7	41.09	3.4	5.46	0.5	8.86	0.7
Abandonment	144.95	12.1	166.98	13.9	173.30	14.5	129.69	10.8
Intensification	83.88	7.0	76.84	6.4	13.83	1.2	4.96	0.4
Urbanization	376.79	31.5	347.33	29.0	155.92	13.0	88.62	7.4
Flooding	18.70	1.6	27.17	2.3	9.88	0.8	5.93	0.5
Total	794.73	66.4	637.17	53.2	625.20	52.2	453.70	37.9

*Deforestation took place also in areas affected by other processes. Deforested areas are therefore excluded from the total sum of process-transformed areas.

The overview of LC categories participating most in individual processes in observed years is presented in Tab. 4. The process of urbanization in all observed period manifested itself particularly in agricultural and natural and semi-natural areas. As for the extent, urbanization affected most the arable land (210) in the period between 1836 and 1949 when 198 ha of arable land were transformed into urbanized areas (with 16.6% share in the total area). The total of 122.27 ha of arable land became overbuilt by urban fabric and 28.24 ha turned into black coal mining areas. 181.62 ha of complex cultivation patterns (15.2% share in the total area) became urbanized in the period of 1949–1964. The total of 77.65 ha was built up by discontinuous urban fabric and 60.38 ha turned into waste banks.

Except the period of 1836-1949, deforestation took place especially in areas of trees, scrub and/or herbaceous vegetation associations (320), whereas the

largest part of these areas became forested in the period of 1985–2009 (8 %) and further in the period of 1964–1985 (4.5 %). Forestation took place also in areas of waste banks (133) between 1964 and 1985 (2 %) and in the period of 1985–2009 (1.4 %).

Deforestation manifested itself most intensively in the period of 1836–1949 by the transformation of forests into complex cultivation patterns (170.28 ha) and trees, scrub and/or herbaceous vegetation associations (63.37 ha). The following years reveal less significant deforestation process. It was only minimally identified in the transformation of forests into green urban areas (143) and trees, scrub and/or herbaceous vegetation associations (320)

In the period of 1836–1949, the process of abandonment was recorded in connection with 63.37 ha of forests (310), 41.31 ha of arable land (210) and 27.46 ha of pastures (231). Between 1949 and 1964 abandonment started to appear also in case of discontinuous urban fabric (112) with the highest figures recorded in the period of 1964-1985 (31.1 ha). Starting from the year 1964 this process was also observed on waste banks that became gradually overgrown with secondary vegetation

Intensive agriculture of the period of 1836-1949 affected 42.9 ha of forests (310) and 30.8 ha of water bodies (512). Between 1949 and 1964 it affected 71.33 ha of complex cultivation patterns (242), which was connected with land consolidation.

Small intensity of the flooding process can be observed in all the studied periods. It concerned particularly the categories of arable land (210), pastures (231), complex cultivation patterns (242), forests (310) and trees, scrub and/or herbaceous vegetation associations (320).

Tab. 4: Overview of LC categories with the highest proportional representation in individual processes within Silesian Ostrava. The percentage is related to the total area of the studied territory. The categories are presented by three-digit numeral identifiers (as after each category name in the text above).

Process		1836–1949			1949–1964			1964–1985			1985–2009		
Forestation	Category	231	210		320	210	242	320	133	210	320	133	112
	ha	0.1	0.0		10.0	4.2	4.0	54.4	23.6	13.9	95.7	16.6	2.8
	%	0.0	0.0		0.8	0.4	0.3	4.5	2.0	1.2	8	1.4	0.2
Deforestation	Category	242	320	210	143	320	133	320	121		320	121	112
	ha	170.3	63.4	42.9	34.0	3.6	1.5	3.8	1.3		5.0	1.7	0.9
	%	14.2	5.3	3.6	2.8	0.3	0.1	0.3	0.1		0.4	0.1	0.
Abandonment	Category	310	210	231	242	210	112	133	112	210	133	210	112

Process		1836–1949			1949–1964			1964–1985			1985–2009		
	ha	63.4	41.3	27.5	85.2	44.4	9.6	59.0	31.1	16.2	38.7	27.0	11.2
	%	5.29	3.45	2.29	7.12	3.7	0.8	4.9	2.6	1.4	3.2	2.3	0.9
Intensification	Category	310	512	231	242	320	112	320	162	111	242	112	320
	ha	42.9	30.8	8.9	71.3	2.2	0.9	5.5	3.9	2.3	4.1	0.4	0.3
	%	3.6	2.6	0.7	6.0	0.2	0.1	0.5	0.3	0.2	0.3	0.0	0.0
Urbanization	Category	210	310	231	242	320	210	320	210	242	320	210	513
	ha	198.2	110.9	51.2	181.6	65.5	54.0	82.8	44.2	16.6	50.7	15.8	10.4
	%	16.6	9.7	4.3	15.2	5.5	4.5	6.9	3.7	1.4	4.2	1.3	0.9
Flooding	Category	210	231	310	320	242	210	320	210	121	163	320	310
	ha	7.6	6.7	3.5	9.2	8.9	5.6	6.5	1.0	0.7	3.0	1.6	0.9
	%	0.6	0.6	0.3	0.8	0.7	0.5	0.5	0.1	0.1	0.3	0.1	0.1

CONCLUSION

The analyzed area represents a region the economic and social character of which changes significantly with the arrival of the Industrial Revolution. Silesian Ostrava was originally a typical agricultural area with poorly developed industry. The transformation started immediately with the industrialization process and related rapid demand for new raw materials, especially coal.

The Polish Ostrava of the year 1836 is dominated by typical agricultural land, particularly arable land, forests and ponds in its southern part. Although no mine is recorded in the stable cadastre of that period, the Body of Appraisers registered two relatively large and equipped mines. First aerial photos from 1949 reveal a strong influence of industrialization of the Silesian Ostrava landscape. Originally agricultural areas turn into industrial areas. There is a considerable decline in the extent of forests and a slight decrease in agricultural areas. An increase is observed in the extent of urban fabric and industry- and mining-affected areas. Urban fabric extent has become consolidated since 1985. The decline in black coal mining activity begins to be apparent in the first half of the 20th century, which is reflected in the reduction of mining-conditioned areas. Arable land shrinked to its historic minimum at the beginning of the 21st century. The highest increase was recorded in case of natural and semi-natural areas, i.e. forests and trees, scrub and/or herbaceous vegetation associations whose occurrence is related to abandoned waste banks, urban fabric or arable land.

The study of the landscape processes revealed the highest intensity in the period of 1836-1949 which witnesses the most extensive processes in all the

studied periods, namely deforestation and urbanization. The process of urbanization continues further in the period of 1949-1964. A common display of deep mining in the landscape is flooding, which is most intensive between 1949 and 1964. Total extent of water bodies is however significantly reduced due to pond water removal between 1836 and 1949.

Since mining activities emerged relatively early in Silesian Ostrava, the effect on the landscape was extensive. The effects of undermining started to appear as early as the mid-19th century as archival sources document first notes of actions for mine damage exactly from this period. Typical mining displays started to appear in the last quarter of the 19th century and they comprised particularly submerged ground subsidences, waste banks and adjoining storehouses and manipulation areas. At the turn of the 1910s and 1920s the Silesian Ostrava landscape was perceived as totally transformed by contemporary observers. Both printed and written sources of that period reflect particularly massive deforestation, land subsidence, historic settlement destruction and gradual disappearance of agricultural production (Archives of Ostrava, Annals of Silesian Ostrava). In comparison with the Karviná region, the impact of mining on built-up areas and transport infrastructure was less destructive and the residential function of landscape has at least partly been preserved.

REFERENCES

[1] BARCUCH, A., ROHLOVÁ, E. Místopis staré Slezské Ostravy. In Ostrava. Příspěvky k dějinám a současnosti Ostravy a Ostravska, 19. Ostrava: Archiv města Ostravy, 1999. pp. 240–297.

[2] BEGEŠOVÁ, P. Časoprostorové změny krajiny v dobývacím prostoru Slezská Ostrava I. [Diplomová práce]. Ostrava: Ostravská univerzita v Ostravě, 2010. 84 p.

[3] BIOPRESS: Linking Pan-European Land Cover Change to Pressures on Biodiversity. [on-line]. Available at WWW: <http://www.creaf.uab.es/biopress/index2.htm>. [cit. 20.6.2008].

[4] EEA: European Environment Agency. URL <http://observe.arc.nasa.gov/nasa/exhibits/history/history_1.html>. [cit. 30.6.2005]

[5] FERANEC, J., OŤAHEL, J. Krajinná pokrývka Slovenska. Land cover of Slovakia. Bratislava: Veda, 2001. 122 p.

[6] JIŘÍK, K. et al. Dějiny Ostravy. 1st ed. Ostrava: Sfinga, 1993. 811 p. ISBN 80-85491-39-7

[7] KNEIFEL, R. Topographie des kaiserl. königl. Antheils von Schlesien. Brünn: Traßler, 1804.

[8] MATĚJČEK, J., KLÁT, J., ZÁŘICKÝ, A. Uhelný průmysl na Ostravsku od poloviny 18. století do konce první světové války. In Uhelné hornictví v ostravsko-karvinském revíru. Ostrava: Anagram, 2003. pp. 32-85.

[9] MATĚJČEK , J. Změny prostředí v hornických a hutnických oblastech českých zemí od počátku průmyslové revoluce do r. 1918. In Macháčová J., Matějček, J. (eds.): Studie k sociálním dějinám 19. století, sv. 2. Opava: Slezský ústav AV ČR, 1993. pp. 266 – 282.

[10] MULKOVÁ, M., POPELKA, P., POPELKOVÁ, R. The Impact of Industrialization on the Landscape of the Ostrava-Karviná Mining District: Landscape changes in the central part of the Karviná region from the first half of the 19th century to the beginning of the 21st century. In Barančoková, M., Krajčí, J., Kollár, J., Belčáková, I. (eds.): Landscape ecology - methods. applications and interdisciplinary approach. Bratislava: Slovak Academy of Sciences, 2010. pp. 433-447. ISBN 978-80-89325-16-0.

[11] MYŠKA, M. Odbyt a použití kamenného uhlí před nástupem průmyslové revoluce (na příkladu vrchnostenských dolů hraběte Wilczeka v Polské Ostravě). Studie z dějin hornictví 14. In Rozpravy Národního technického muzea 93. Praha: Národní technické muzeum, 1984. pp. 125–151.

[12] PAVLÍKOVÁ, A. Časoprostorové změny krajiny v dobývacích prostorech Slezská Ostrava III a Michálkovice. [Diplomová práce]. Ostrava: Ostravská univerzita v Ostravě, 2009. 94 p.

[13] PVS ČR: Portal of Public Administration of the Czech Republic. Map services [online]. URL <http://geoportal.cenia.cz/>. [cit. 27.6.2011]

[14] Zemský archiv Opava. Fond Revírní báňský úřad Moravská Ostrava. kart. 21. 22.

[15] Zemský archiv Opava. Fond Stabilní katastr slezský. kart. 176

Vliv hornické činnosti na krajinu Slezské Ostravy v 19. a 20. století

Analyzovaná oblast reprezentuje typ regionu, jehož ekonomicko-sociální charakter se podstatně proměnil s nástupem průmyslové revoluce. Slezská Ostrava byla původně typickou zemědělskou oblastí s málo rozvinutým průmyslem. Proměna začíná v okamžiku nástupu industrializačního procesu a s ním spojenou prudkou poptávkou po nových surovinách, zvláště pak uhlí.

V roce 1836 představuje tehdejší Polská Ostrava typickou zemědělskou krajinu s významnou převahou orné půdy, lesních porostů a rybníků v jižní části území. Ačkoliv císařský otisk stabilního katastru neeviduje žádný uhelný důl, podle oceňovacího operátu zde fungovaly dva relativně velké a na svou dobu dobře vybavené uhelné doly. V roce 1949 je z prvních leteckých snímků patrný silný vliv industrializace na krajinu Slezské Ostravy. Někdejší zemědělská oblast se transformuje v oblast průmyslovou. Silně klesá podíl lesů, mírný pokles se začíná projevovat u zemědělských areálů, posiluje se rozloha sídelní zástavby i rozloha ploch ovlivněných průmyslovou a

důlní činností. Od roku 1985 se ustálila rozloha sídelní zástavby. K útlumu těžby černého uhlí dochází v první polovině 90. let 20. století, což se projevuje poklesem rozlohy areálů podmíněných hornictvím. Na počátku 21. století klesla rozloha orné půdy na dlouhodobé minimum. Největší nárůst zaznamenaly přírodní a polopřírodní areály, tj. lesy a kategorie stromů, křovin nebo travních areálů, jejichž výskyt je vázán na opuštěné plochy odvalů, sídelní zástavby nebo orné půdy.

Při sledování procesů v krajině bylo zjištěno, že nejvýrazněji se sledované procesy projevují v období 1836–1949, kdy proběhly plošně nejrozsáhlejší procesy ze všech sledovaných časových úseků, a to proces odlesnění a urbanizace. Proces urbanizace pokračuje významně i v období 1949–1964. Obvyklým projevem hlubinné těžby v krajině je proces zavodňování, který se nejvíce projevil mezi lety 1949–964. Celková rozloha vodních ploch však byla výrazně snížena procesem odvodňování rybníků mezi lety 1836 a 1949.

Vzhledem k tomu, že se začalo na území Slezské Ostravy s těžbou již poměrně brzy, byl dopad na krajinu nesporně velmi časný. Vliv poddolování ve Slezské Ostravě se začal projevovat přinejmenším už v polovině 19. století, kdy máme v archivních pramenech dochovány první zprávy o sporech za důlní škody. Přinejmenším v poslední čtvrtině 19. století se začaly na sledovaném území ve velkém objevovat typické projevy hlubinné těžby uhlí: zatopené poklesové kotliny, haldy hlušiny i stále rostoucí objekty dolů a přináležejících skladišť a manipulačních prostorů. Na přelomu první a druhé dekády 20. století začala být krajina Slezské Ostravy vnímána dobovými pozorovateli již jako zcela přeměněná. V dobovém tisku i písemných pramenech je reflektováno zvláště masivní odlesnění, poklesy půdy, destrukce části původní zástavby i postupný zánik zemědělské výroby (Archiv města Ostravy, kronika města Slezské Ostravy). Ve srovnání s Karvinskem však rozsah důlních škod na zástavbě a dopravní infrastruktuře nebyl v takovém rozsahu destruktivní, takže zůstala alespoň částečně zachována obytná funkce krajiny.

REGIONAL GEOGRAPHY AND REGIONAL DEVELOPMENT – OPPORTUNITY FOR PRACTISE

ACADEMIC INSTITUTIONALIZATION AND SOCIAL RELEVANCE OF GEOGRAPHY

René Matlovič, Kvetoslava Matlovičová, Barbora Némethyová

University of Presov

Department of Geography and Regional Development, Ul. 17. Novembra 1, 081 16 Prešov, Slovakia

rene.matlovic@unipo.sk, kveta.matlovicova@gmail.com, barbora.nemethyova@gmail.com

Abstract: *The relevance of a scientific discipline determines its position in the context of other scientific disciplines, which nowadays increasingly compete among themselves for limited financial sources and try to increase the attractiveness of human resources. Therefore, the question of relevance may become a question of its further development or even survival. Academic institutional establishment of geography can be considered as an important signal of confirmation of its social relevance. Institutional changes related to geography can significantly influence its social position and its future. Throughout the history of geography we can differentiate a number of events and turmoil that either significantly strengthened or, on the contrary, weakened the prestige of geography. The first option included establishment or renewal of academic geographic departments. The other involves attenuation and abolishment of geographic departments. In our contribution we will briefly indicate how were the changing circumstances of the institutionalization of geography related to its social relevance.*

Key words: *academic institutionalization, branding, geography, social relevance*

INTRODUCTION

The relevance of a scientific discipline determines its position in the context of other scientific disciplines, which nowadays increasingly compete among themselves for limited financial resources. Therefore, the question of relevance may become a question of its further development or even survival. Academic institutional establishment of geography can be considered as an important signal of confirmation of its social relevance. Institutional changes related to geography can significantly influence its social position and its future. Throughout the history of geography we can differentiate a number of events and turmoil that either significantly strengthened or, on the contrary, weakened

the prestige of geography. The first option included establishment or renewal of academic geographic departments. The other involves attenuation and abolishment of geographic departments. In our contribution we will briefly indicate how were the changing circumstances of the institutionalization of geography related to its social relevance.

ETATISTIC FEATURES OF INITIAL ACADEMIC INSTITUTIONALIZATION OF GEOGRAPHY

The question of social relevance of geography is not new. It emerged already in the initial phase of institutionalization of geography as a modern discipline, which begun in the 19th century. Several geographic societies and institutes were formed and geography was continually established as a modern field of study at the university level. The academic institutionalization of geography can be perceived as a means of confirming its relevance, because it enables professionalization and consequent reproduction of human resources, inevitable to ensure the professional geographic research and education. On the other side we have to admit that the academic institutionalization does not have to be the only way for confirmation of relevance of geography.[1]

The beginnings of academic institutionalization of geography can be associated with German universities[2], (the first authentic professorship of geography was

[1] An example may be a geography of Catalonia, which showed quite good vitality, quality and modern approaches and even though it did not have a position of a university discipline. Geographer Paul Vila, influenced by vidalian regional-geographic tradition, under the authority of the Catalan autonomous government in 1932 prepared with his team an innovative project of regional division of Catalonia. At the University of Barcelona the study programme of geography was prepared in the academic year 1936-37, but its implementation was delayed due to the civil war (Albet, Zusman, 2009, p. 296).

[2] Geography was lectured at the universities also before its official institutionalization. It is evident that at the University of Königsberg (today Kaliningrad) physical geography was lectured by Immanuel Kant in 1784. At the Sorbonne in Paris they established the professorship of geography already in 1809, however it was occupied by historians. The first authentic professorship of geography was established in 1825 at the university in Berlin and the first professor became Karl Ritter (Hess 2009, p. 481). Another professors were G.B. Mendelssohn in Bonn (1847, died in 1857), Eduard Wapäus in Göttingen (1854), Karl J.L. Neumann in Vratislav (1856) and Robert von Schlagintweit in Giessene (1864). After Ritter`s death in 1859 the professorship in Berlin remained unoccupied and the lectures were carried out by a historian, associate professor Heinrich Kiepert. It created a hiatus, because in the period of 1859-1871 there was not any new professor appointed. Later in 1871 Oscar Peschel in Leipzig was appointed a professor (James, Martin 1981, p. 164). A major breakthrough occurred in

established in Berlin, in 1825). It was related to the then university sector changes, which were a reaction to social discontent with their then conditions. Wilhelm von Humboldt developed a new model of university, based on which a university in Berlin was established in 1810. Humboldt principles were then applied also to other universities (Hejwosz 2010, p. 75). Regarding the establishment of geography a key role was the academic freedom of research and lecturing, which released strict academic curricula and enabled to choose the subjects, in which the students were interested in. Humboldt`s principle of the unity of knowledge was based on the philosophical assumption that the individual branches of science are complementary and together they form general knowledge and are therefore equally important (Hejwosz 2010, p. 75). A very important factor in the academic institutionalization of geography was the influence of a state. It resulted from the historical-political situation in the 70s of the 19th century, when after the Franco-Prussian War and the unification of several German countries in 1871 a new state needed geographic education for its stabilization, which would contribute to the consolidation of a new territorial identity. It shows that the motives that lead to the institutionalization of geography at German universities were not based on scientific relevance or internal stimuli reflecting natural development of scientific knowledge.

It was proved also by the fact that even the scientific boards of universities protested against state authorities, because geography as a field of study was established largely against their will. It was typical that several newly established departments employed scientists with non-geographic education[3] (Filipp 1992, p. 10).

As Filipp (1992, p. 11) reminds, this development caused that geography had become a scientific discipline dependent on state power. Social-political and war events and expansion of nation states in the second half of the 19th century stimulated geographic research and education in other European countries. Prussian victory in the war with France was the result of better geographic knowledge of Prussian military forces. The failure and the loss of Alsace-Lorraine triggered a growing wave of patriotism in France that increased the demand for geographical knowledge about the French territory and inhabitants.

1874, when Prussian government decided to establish the professorships of geography at all Prussian universities. (James, Martin 1981, p. 165). Under the German influence another geographic departments were created in Central Europe relatively very soon – e.g. in Krakow (1849), where a poet Wincenty Pol became a professor and in Vienna (1851), where the first professor of geography was Friedrich Simony.

[3] For example botanist and historian Kirchhoff in Halle (1871), philologist and historian Gerland in Strasbourg (1873), geologist von Richthofen in Bonn (1873), philologist, historian and geographer Partsch in Vratislav (1876), mathematician Wagner in Königsberg (1876), botanist and historian Fischer in Kiel (1878) (Filipp, 1992, p. 10).

State therefore supported the development of geographic curriculum very actively (Benko, Desbiens, 2009, p. 271). As a result, geography was established throughout the number of French universities[4], even it had to face the resistance of the other sciences as well as left-oriented wings that promoted internationalist ideas (Maddrell, 2009, p. 421). Similarly, the Japan`s geographical knowledge was strategically useful in the China-Japanese and the Russian-Chinese war at the end of the 19th and at the beginning of the 20th century. In the military fields, geography was largely represented in the Latin-American countries, which continually established their own military geographic institutes – in Argentina (1904), Chile (1992), Columbia (1935) and Bolivia (1936) (Albet, Zusman, 2009, p. 299). In the USA, the development of geography also ties to the national interests in the expansion and consolidation of territory and national identity. The development of modern geography was closely related to the terrain research of western regions, which was a part of geological research and had the support of federal government. New earth sciences departments at the U.S. universities were therefore mainly common geological-geographical departments or institutes[5]. (Maddrell, 2009, p. 420-421). In a similar socio-political context the primary academic institutionalization of Czech geography took place. The first associate professor of geography at the University of Prague had become Jan Palacký in 1856, who was later in 1891 appointed a professor of geography. In the 90s of the 19th century a national emancipation struggle of the Czech nation culminated. In this period the Geographical Association of Bohemia was established and a new geographic scientific journal was released (Jeleček 2004, p. 13). In Slovakia the first academic department was formed at the Comenius University in Bratislava in the 20s of the 20th century. Geography was already lectured in the academic year 1921-1922. The existence of a separate workplace (Geographic seminar) dates back to 1923 (Lauko 2006, p. 45). It was a period when after the formation of Czechoslovakia in 1918, Slovak institutions of higher education were freely formed, which was not possible in the previous period.

[4] The first geographer who was appointed a professor of geography at the Sorbonne in Paris, established in 1809, was Paul Vidal de la Blache in 1898 (James, Martin 1981, p. 190). In 1921 geography departments were established at almost every out of 16 French universities (James, Martin 1981, p. 192).

[5] Geography as a modern discipline was introduced due to the geologist Wiliam Morris Davis at Harvard in 1878, where he began to act as an instructor of physical geography. Consequently new departments providing geographic courses were established also at The Columia Teachers College (1899), The Cornell University (1902), The University of California (1903), The University of Chicago (1903), The University of Nebraska (1905), The Miami University (1906) and continually at other universities (James, Martin, 1981, p. 280).

A different situation was in the Great Britain. If we do not take into consideration a short existence of professorship at the University of London in 1830, the first permanent professorship was established in 1887 at the University of Oxford[6], and one year later in Cambridge. Several British universities were rather reluctant to introduce geography as an academic discipline, because they had an aversion to its ties with the empire. It was also criticized for the lack of scientific rigorosity (Maddrell, 2009, p. 421). Introducing of geography at British universities was mostly the result of The Royal Geographical Society efforts (James, Martin 1981, p. 201). However, less importance of state in the establishment of British geography did not mean that the questions of social relevance of the discipline were forgotten. H. Mackinder had mentioned in his inauguration speech that new geography could serve for the needs of statesmen, businessmen, scientists, historians and teachers (Maddrell 2009, p. 421). British geography in its further development had supported the application line, mainly in the field of urban and regional development (Unwin 2006). This was primarily due to D. Stamp and his followers (Unwin 2006).

CONSEQUENCES OF ETATISTIC INSTITUTIONALIZATION OF GEOGRAPHY

Etatistic institutionalization of geography to some extent influenced the further development of the discipline. A contradictory situation was created inside the geographic community, where on one hand the etatized geography should have been obedient to the state which ensured the support and resources for its survival. On the other hand, the scientific requirements could find themselves contradictory to the requirements of state (Filipp, 1992, p. 11). It resulted in still persisting doubts of several geographers about the role of the discipline and frequent discussions of geographers about the relevance, identity, external position of geography as a scientific discipline and the search for a unifying platform for increasingly fragmented system of geographic disciplines and paradigms (more in Matlovič 2006, 2007, 2009, Matlovič, Matlovičová 2007).

These concerns about the scientism cyclically occur during the development of geography. Already in the late pre-modern era in the 18th century, geography faced a notable criticism. M Bowen (1981 in Wilczyński 2010, p. 87) noticed that the quantitative increase in the number of publications was not accompanied by a qualitative increase in its substantive level. This was

[6] Halford J. Mackinder was appointed a professor at the Oxford University in 1887. Besides the scientific activities he carried out a number of functions in practice – among other things, he was a member of Parliament in 1910–1922.

probably one of the reasons why geography in the 18th century lagged behind the prestige of physics, astronomy and biology. Criticism had been directed mainly to its descriptive character, stuffiness, excessive popularity and the lack of theoretical foundations based on a consistent philosophy. Insufficient scientism, however, at this time did not endangered social relevance and appreciation of geography. It was proved, for example, by costly expeditions organized from England to Oceania. The importance of geography in the then society was anchored in its practical benefits in expanding of spheres of influence of individual European countries. However, the scientific reputation of geography was not high, which was evident in the negative reactions of university scientific boards on the establishment of geographic professorships in the 19th century. Even more unpleasant consequences in relation to geography were brought after the World War II in the U.S.A. A numerous group of geographers during the war were called into the army and intelligence services. Though, it turned out that their knowledge and skills are inadequate. Geographers had wide, but still shallow knowledge. The solution of problems required rather precise and deep analyses of information. E. Ackerman (1945, p. 124) in his critical contribution suggested that the war revealed the truth about geographers as "more or less amateurs in the subject in which they publish". Geography reputation had somewhat suffered also from discredited geopolitics (collaboration with Nazis) and criticism of geographic determinism[7] and exceptionalism (e.g. Schaefer 1953). These facts influenced the decision of the prestigious Harvard University to cancel the Department of geography in 1948 (Castree 2005, p. 61). In the next years it was followed by Yale, Stanford, University of Michigan, Columbia and The University of Chicago. In the prestigious group of American universities which are united in the Ivy League since 1954, only the geography at Dartmouth College was maintained. The leaders of American geographic departments even the decades after these events, for example at the AAG Annual Congress (The Association of American Geographers), worried about the question of maintaining their existence (Cohen 1998). However, in the last decades, positive signals for the improvement of social prestige of geography were recorded. AAG draws its attention to the questions of social relevance since the 90s of the 20th century. This effort is documented in the comprehensive publication from 1997 (Rediscovering…). One positive signal is the renewal of geography at prestigious Harvard University in 2006 in the form of center for geographic

[7] German geopolitics which introduced the concept of "*Lebensraum*", continually developed itself during the interwar period into the doctrine based on geographic determinism and explaining territorial conquests. (Ištok 2003, p. 70). Some authors (e.g. Wojtanowicz, 2009, p. 30) point at the inadequacy of the complete rejection of geographic determinism. They consider this approach as ideological and harmful, because it evokes a total independence of a human on the geographic environment.

analyses, strictly oriented on spatial-analytical geography and geospatial technologies (Nayak, Jeffrey 2011, p. 49).

In addition to the criticism of low scientism of geography, which could endanger the relevance of a science, there appeared another kind of criticism, which is to some extent related to the etatistic support of geography. It was a period of the late 60s and early 70s of the 20th century. Particularly the young generation of geographers in the USA and later in The Great Britain was frustrated by the then government policies, which led the war in Vietnam, or were unable to cope with the growing economic disparities and social injustice. For this reason they were not interested in the activities applying geographic knowledge in favor of government power, because they saw in them the support of hatred capitalism (Unwin 2006). Discontent was fully revealed at the AAG meeting in Boston in 1971. Geographers had claimed there that they intend to be socially involved even outside the auditoriums and libraries, which had led to the formation of politically radical wing directed to Marxism, anarchism, and other critical movements (Unwin 2006, p. 115). As Unwin (2006, p. 116) suggested, in further discussions there appear nontrivial semantic difference between "applied geography" and "relevant geography", which even could be perceived as binary oppositions. While the applied geography was associated primarily with the saturation of the needs and interests of official establishment, the relevant geography emphasized the solution of social problems, particularly social injustice, poverty and marginalization (Unwin 2006, p. 116). Some critics of the applied geography questioned its explanatory and prediction capabilities, which must be perceived in the broader context of criticism of logical positivism and on its basis developing spatial-analytical geography at the turn of 60s and 70s of the 20th century. This criticism was focused mainly on unrealistic demands on the objectivity of research, dehumanization, extreme reductionism, ignoring the ethical issues and remoteness from the solutions of contemporary problems. A part of the critical wing members therefore avoided applied research and focused rather on the questions of research quality and its framing among the modern theoretical and intellectual discussions. The other group of critical geographers offered an alternative to the existing applied geography. In this context, we could mention the activities of D. Harvey, D. Mitchell in the field of so called People`s Geography, which resulted in an initiative entitled "The People`s Geography Project". They aimed at the critical evaluation of everyday life in the context of changing power relations and social relations and on the possibilities of transformation these relations in order to achieve social justice (http://www.peoplesgeographyproject.org/).

Along with the radical movement, based on the criticism of spatial-analytical geography, a new humanistic wing was formed, which also did not neglect the

question of relevance. The question of relevance of geography is seen by the representatives of humanistic geography according to Buttimer (1991, p. 111) in the context of a shift of interest by the representatives of the other scientific disciplines (e.g. anthropology, land architecture, history, literature) and applied fields (e.g. law, psychotherapy) – towards the traditional and fundamental geographic concepts such as space and place, openness and closeness, home and country, territory and distance, immobility and mobility. In this context, there are warnings that geographers can become a minority in their own discipline, because other scientists significantly contribute to the development of geography more than the geographers themselves.

CONCLUSIONS

In the paper we have tried to highlight the interdependencies between the academic institutionalization and social relevance of geography. Institutional changes related to geography have significantly influenced its social position and future. Initial academic institutionalization, which we consider as a signal for confirmation of social relevance of geography, had been realized in most countries based on the initiative or significant state support. Besides the indisputable advantages, however, the etatistic institutionalization of geography has also brought some negatives. It is mainly a contradictory situation, where on one hand the etatized geography should have been obedient to the state which ensured the support and resources for its survival. On the other hand, the scientific requirements could find themselves contradictory to the requirements of a state (Filipp, 1992, p. 11). Another consequence were several critical movements within the geographical thinking, which were rather resistant towards the support of official establishment. The accompanying effect involves still persisting doubts of several geographers about the role of the discipline and frequent discussions of geographers about the relevance, identity, external position of geography as a scientific discipline and the search for a unifying platform for increasingly fragmented system of geographic disciplines and paradigms. This, of course, weakens the geography, which must face the competitive struggle for recognition with other sciences. It is a basic assumption for obtaining financial and human resources, which are inevitable for further development or at least survival of a scientific discipline. Geographical community should pay a constant attention to the issues of strengthening the institutional background and social relevance. Based on the fact that the competitive struggle for financial and human resources carries the attributes of market competition, the appropriate tools for the realization of social relevance policy and institutional development of geography could be marketing approaches (Matlovičová 2007, 2008). The most significant tool is

branding of geography as a strong, heuristically, educationally, and applicably relevant discipline.

Acknowledgement: The paper is a part of the research project VEGA no. 1/0611/09: Koncept miesta v regionálno-geografickej analýze a syntéze a teritoriálnom marketingu: teoreticko-metodologický rámec a aplikácia na vybrané modelové územia.

REFERENCES

[1] AALBERS, M. B., ROSSI, U. Anglo-American/Anglophone Hegemony. In: Kitchin, R., Thrift, N., (eds.):*The International Encyclopedia of Human Geography*. 1., Boston-London: Elsevier Ltd., 2009, pp. 116-121. ISBN: 978-0-08-044911-1

[2] ACKERMAN, E. A., Geographic Training, Wartime Research and Immediate Professional Objectives. *Annals of the Association of American Geographers*, 1945, 34, 4, 121-143.

[3] ALBET, A., ZUSMAN, P. Spanish Language Geography. In: Kitchin, R., Thrift, N., (eds.):*The International Encyclopedia of Human Geography*. 10., Boston-London: Elsevier Ltd., 2009, pp. 296-301. ISBN: 978-0-08-044911-1

[4] BENKO, G., DESBIENS, C. (2009): Francophone Geography. In: Kitchin, R., Thrift, N., (eds.):*The International Encyclopedia of Human Geography*. 4., Boston-London: Elsevier Ltd., pp. 271-276. ISBN: 978-0-08-044911-1

[5] BOWEN, M. Empiricism and geographical thought from Francis Bacon to Alexander von Humboldt. Cambridge University Press, Cambridge, 1981, 351 p.

[6] BUTTIMER, A. Humanism and Relevance in Geography. *Scottish Geographical Journal*, 1999, 115, č. 2, s. 103-116.

[7] CASTREE, N. Is Geography a Science? In Castree, N., Rogers, A., Sherman, D., (eds.):*Questioning Geography.*Oxford: Blackwell Publishing, 2005, pp. 57-79. ISBN 978-1-4051-0192-9.

[8] COHEN, P. Geography Redux: Where You Live Is What You Are. *New York Times*, 1998, 21. 3. 1998, pp. A17, A19.

[9] FILIPP, K. Geographia Teutonica – prolegomena k emancipaci vědní disciplíny. Praha: IRIS, 1992, 141 p.

[10] HEJWOSZ, D. Edukacja uniwersytetska i kreowanie elit społecznych. Kraków: Impuls, 2010, 332 p. ISBN 978-83-7587-271-2.

[11] HESS, M. German-Language Geography. In: Kitchin, R., Thrift, N., eds., *The International Encyclopedia of Human Geography*. 4., Boston-London: Elsevier Ltd., 2009, pp. 481-486. ISBN: 978-0-08-044911-1

[12] IŠTOK, R. Politická geografia a geopolitika. Prešov: FHPV PU, 2003, 392 p. ISBN 80-8068-191-0.

[13] JAMES, P. E., MARTIN, G. J., (eds.)*All Possible Worlds. A History of Geographical Ideas*. Second Edition. New York: John Wiley &Sons, 1981, 508 p.

[14] JELEČEK, L., An Outline of Czech Geography Evolution since the Second Half of the 19th Century until 1980´s. In Drbohlav, D., Kalvoda, J., Voženílek, V. (eds.) Czech Geography at the Dawn of the Millenium. Olomouc, Palacky University and Czech Geographic Society, 2004, pp. 11-22. ISBN 80-244-0858-9.

[15] LAUKO, V. Transformácia slovenskej geografie, jej dôsledky a problémy. *Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Presoviensis, Folia Geographica*, 2006, 9, pp. 44-55. ISSN 1336-6157.

[16] MADDRELL, A. Geography, History of. In: Kitchin, R., Thrift, N., (eds.):*The International Encyclopedia of Human Geography*. 4., Boston-London: Elsevier Ltd., 2009, pp. 415-428. ISBN: 978-0-08-044911-1.

[17] MATLOVIČ, R. Geografia – hľadanie tmelu (k otázke autonómie a jednoty geografie, jej externej pozície a inštitucionálneho začlenenia so zreteľom na slovenskú situáciu). *Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešoviensis, Folia Geographica*, 2006,9, pp. 6-43. ISSN 1336-6157.

[18] MATLOVIČ, R. Hybridná idiograficko-nomotetická povaha geografie a koncept miesta s dôrazom na humánnu geografiu. *Geografický časopis*, 2007, 59, 1, pp. 3-23. ISSN 0016-7193

[19] MATLOVIČ, R. K problematike novej systemizácie regionálnogeografických poznatkov. *Acta Geographica Universitatis Comenianae*, 2009,53, pp. 11-18. ISSN 0231-715X

[20] MATLOVIČ, R., MATLOVIČOVÁ, K. Koncept miesta vo vývoji geografického myslenia. In: Kraft, S., Mičková, K., Rypl, J., Švec, P., Vančura, M., (eds.), Česká geografie v evropském prostoru. Jihočeská univerzita, České Budějovice, 2007, pp. 181-190. ISBN 978-80-7040-986-2.

[21] MATLOVIČOVÁ, K. Place as a overlap between interests of regional geography and marketing. *Revija za geografijo*, 2007, 2, 2, pp. 53-62. ISSN1854-665X

[22] MATLOVIČOVÁ, K. Place marketing process – theoretical aspects of realization. *Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Presoviensis, Folia Geographica*,2008, 12, pp. 195-224. ISSN 1336-6157.

[23] NAYAK, A., JEFFREY, A. Geographical Thought. An Introduction to Ideas in Human Geography. Harlow: Prentice Hall, 2011, 337 p., ISBN 978-0-13-222824-4.

[24] *Rediscovering Geography: new relevance for science and society*. Washington D. C.: Rediscovering Geography Committee, National Research Council, 1997, 248 p. ISBN-10: 0-309-07679-X.

[25] SCHAEFER, F. K. Exceptionalism in Geography: A methodological examination. *Annals of the Association of American Geographers*, 1953, 43, pp. 226-245.

[26] UNWIN, T. 100 Years of British Geography: The Challenge of Relevance. *Inforgeo*, 2006, No.18/19, pp. 103-126.

[27] WILCZYŃSKI, W. Ideowe źródła i tożsamość geografii. Kraków: Uniwersytet Pedagogiczny, 2010. Manuskript in press, 106 p.

[28] WOJTANOWICZ, J., O wartościach w geografii. Prawdy i mity w geografii. In Janicki, G., Łanczont, M., eds., *Geografia i wartości*. Lublin: Wydawnictwo UMCS,2009, pp. 27-31. ISBN 978-83-227-2933-5.

[29] WRIGHT, R., KOCH, N. Ivy Legue and Geography in the US. In: Kitchin, R., Thrift, N., (eds.):*The International Encyclopedia of Human Geography*. 5., Boston-London: Elsevier Ltd., 2009, pp. 616-621. ISBN: 978-0-08-044911-1.

Akademická inštitucionalizácia a sociálna relevancia geografie

V príspevku sme sa snažili poukázať na vzájomné súvislosti medzi akademickou inštitucionalizáciou a spoločenskou relevanciou geografie. Inštitucionálne zmeny týkajúce sa geografie významne ovplyvňovali jej spoločenskú pozíciu a budúcnosť. Prvotná akademická inštitucionalizácia, ktorú považujeme za signál potvrdenia spoločenskej relevancie geografie, bola vo väčšine krajín realizovaná z iniciatívy alebo výraznej podpory štátu. Okrem nesporných výhod však etatistická inštitucionalizácia geografia priniesla aj negatíva. Ide najmä o vznik rozpornej situácie, keď na jednej strane etatizovaná geografia mala byť poslušnou voči štátu, ktorý jej zabezpečoval podporu a prísun zdrojov a tým aj prežitie. Na druhej strane však požiadavky na vedeckosť sa mohli ocitnúť v kontradikcii vo vzťahu k požiadavkám štátu (Filipp, 1992, s. 11). Iným dôsledkom boli viaceré kritické prúdy v rámci geografického myslenia, ktoré sa dištancovali od podpory oficiálneho estabilšmentu. Sprievodným efektom sú dodnes pretrvávajúce pochybnosti mnohých geografov o poslaní vlastnej disciplíny a časté diskusie geografov o relevancii, identite, externej pozícii geografie ako vednej disciplíny a hľadaní zjednocujúcej platformy pre čoraz viac fragmentizovanú sústavu geografických disciplín a paradigiem. To samozrejme oslabuje geografiu, ktorá musí zvádzať konkurenčný zápas s inými vedami o uznanie. To je základným predpokladom získavania finančných a ľudských zdrojov, ktorú sú nevyhnutným predpokladom ďalšieho rozvoja alebo aspoň prežitia vednej disciplíny. Otázkam posilňovania inštitucionálneho zázemia a spoločenskej relevancie musí geografická komunita venovať sústavnú pozornosť. Vzhľadom na to, že konkurenčný zápas o finančné a ľudské zdroje nesie atribúty trhovej konkurencie, vhodnými nástrojmi realizácie politiky spoločenskej relevancie a inštitucionálneho rozvoja geografie môžu byť marketingové prístupy (Matlovičová 2007, 2008). V rámci nich je to najmä budovanie značky geografie (branding) ako silnej, heuristicky, edukačne a aplikačne relevantnej disciplíny.

EURO-REGIONAL COOPERATION IN THE TRIPLE DANUBE EURO-REGION

Angelika Švecová, Eva Rajčáková

Department of regional geography, protection and landscape planning
Comenius University Bratislava, Faculty of Natural Sciences, Mlynská dolina, 842 15 Bratislava, Slovak republic
asvecova@fns.uniba.sk, rajcakova@fns.uniba.sk

***Abstract**: Promoting Euro-regional cooperation is currently one of the topical issues of regional policy. Its importance is increasing especially in the regions which are slowly developing to marginal regions in the regional structure. The Triple Danube area Euro-region is an example of this. The aim of this paper is to highlight opportunities for active Euro-regional cooperation and its impact on its position in the regional*
***Key words**: Cross-border cooperation, Slovakia, Euro-region, Triple Danube structure.*
Euro-region.

INTRODUCTION

Cross-border cooperation is one of the instruments of regional policy focused on overcoming borders and barriers between countries, and it tries to minimize disparities on both sides of the border in order to improve mutual cooperation in all aspects of life.

In 1980, on the initiative of the Council of Europe, a group of European countries concluded an international treaty, the so-called "Madrid Convention", as a first step towards cross border cooperation (CBC) structures based on public law. This provides a legal framework for completing bi- and multi-national agreements for public law CBC among non-centralized governments. According to the Convention, cross-border cooperation is considered to include all activities for strengthening and supporting neighbourhood relationships in border areas on both sides of the common border. These activities come under the Council of Europe, and the basis for meeting its main objectives is the greatest possible unification of European countries and their populations [1]

Compared with the Council of Europe, the CBC-related activities of the EU are primarily financial. Many CBC initiatives are eligible for support under the Interreg Community Initiative launched by the European Commission in 1990. This policy was re-confirmed as Interreg II in 1994, Interreg III in 1999 and as Interreg IV in 2007 [2].

The cross-border co-operation which has existed in Western Europe since the 1950's could only be launched in the post-communist countries of Central and Eastern Europe following democratization in the 1990s.

EURO-REGIONS IN SLOVAKIA

Cross-border regions in the Slovak Republic have been negatively affected by historical development. Due to the strong centralization policy of socialist governments, all integration initiatives across borders were stifled. Most border regions became marginalized. The need to develop these regions, to eliminate disadvantages of their peripheral position and to balance disparities appeared only after 1990, Cross-border cooperation was not supported by government authorities until 1998. Initially, the biggest barrier to successful cooperation was the legislative framework, because foreign countries interested in a partnership could not find a suitable partner in Slovakia. Legislative preconditions were not created until after 1999 for the participation of self-governing bodies in cross-border cooperation.

Despite several problems, the cross-border and Euro-regional cooperation is becoming one of the most effective instruments of cross-border regional development. The most important and also the most effective forms of this cross-border cooperation in Slovakia appear to be Euro-regions. The greatest boom was in 1999-2001, when 9 of 12 current Euro-regions were established (Tab. 1).

Preconditions for successful cooperation were institutional and organizational support by creation of an adequate legislative and institutional environment.

Since 2002 the Euro-regions have been registered at the Ministry of Interior, and the other competencies and project activities fall under the Ministry of Construction and Regional Development of the Slovak Republic, and from 2010, under the Ministry of agriculture and rural development.

The aim of "Slovak Euro-regions" cooperation is to support all kinds of activities aimed at regional development of entire territories with minimal impact of border and barrier effects. Other significant aspects of cooperation include learning, building confidence, overcoming disadvantages of peripheral areas and improving the standard of living.

Cross-border cooperation is most developed on the Slovak-Hungarian frontier – within 8 Euro-regions. One of these Euro-regions is the Triple Danube Euro-region.

Tab. 1: Euro-regions in Slovakia

Euroregion	Partners	Established	Centre in Slovakia
Pomoravie-Weinviertel-South Morava	A, CZ	23.6.1999	Holíč
White Carpathians	CZ	30.7.2000	Trenčín
Beskid Mountains	CZ, PL	9.6.2000	Žilina
Tatry	PL	26.8.1994	Kežmarok
Carpathian	H, PL, RO, UA	25.11.1999	Prešov
Košice-Miškolc	H	1.12.2000	Košice
Slaná-Rimava	H	10.10.2000	Rimavská Sobota
Kras	H	1.3.2001	Jablonov nad Turnou
Neogradiensis	H	25.3.2000	Lučenec
Ipel	H	6.8.1999	Šahy
Vag-Dunube-Ipel	H	3.7.1999	Nitra
Triple Danube	H	25.1.2001	Dunajská Streda

Source: MV SR 2006, http://www.civil.gov.sk/p03/p03-01-05.shtm

TRIPPLE DANUBE EUROREGION

Slovak-Hungarian relations have always been a controversial topic related to their historical development. After the separation of the Slovak Republic and its accession to the European Union, there has been significant progress in improving the cross-border relationship between these two countries. One such example is the Triple Danube Euro-region located on the Slovak-Hungarian border, which currently reflects successful cross-border cooperation of these two different nations.

The Triple Danube Euro-region was established on the 25th of January, 2001 when the representatives of founding members signed The Articles of Association.

	Euroregión	***Slovak part***	***Hungarian part***
Regional Association	Triple Danube Euroregion	Csallóköz–Mátyusföldi Regional Association	county Győr-Moson-Sopron
Head office	Győr	Dunajská Streda	Győr
Area in km^2	5.805	1.716	4.089
Population	640.043	205.334	434.709

The area of the Euro-region covers the Győr-Moson-Sopron County and 37 settlements of three districts in Slovakia (Tab.2)

Tab. 2: List of the members of the Triple Danube Euro-region in Slovakia

County	Members	Number
Dunajská Streda	Obvodný úrad Dunajská Streda, Dunajská Streda, Malé Dvorníky, Ohrady, Dunajský Klátov, Okoč, Veľký Meder, Horná Potôň, Šamorín, Topoľníky, Trhová Hradská, Baloň, Čenkovce, Čiližská Radvaň, Gabčíkovo, Kútniky, Janíky, Vrakúň, Dolný Štál	19
Galanta	Obvodný úrad Galanta, Galanta, Košúty, Vozokany, Mostová Dolné Saliby, Dolný Chotár, Tomášikovo, Jelka, Váhovce, Veľká Mača, Veľké Úľany, Sládkovičovo, Trstice, Matúškovo, Kráľov Brod	16
Šaľa	Diakovce, Tešedíkovo	2
Total		37

Source: Common programme document, 2006

The Danube Triple Euro-region is located in the border area with strong economic growth, but it also has considerable spatial differentiation of rural and urban areas. Top economic indicators have been achieved in the western part of this Euro-region in both countries, and also in all cities of the Euro-region. [3]

From natural and economic viewpoints, the Danube Triple Euro-region area has a very good position. There is great natural potential, characterized by good climate and natural resources including thermal springs, wetlands, lakes, the Danube branches and national parks. The region is situated at the crossroads of European routes, close to metropolitan areas, international airports and major cities of both countries. There are very similar attributes on both sides of the Euro-region. It provides good conditions for cooperation in various economic sectors such as tourism, infrastructure, human resources and employment, restoration of cultural and historical monuments, cooperation in environmental protection, education, sport and culture. Despite their similar characteristics, these two areas have different levels of economic development.

The Slovak part of this Euro-region is one of the economically less developed areas of Slovakia. [4] On the other hand, due to good conditions for agriculture with the high percentage of more than 75% agricultural land and a suitable

climate, this area represents a high potential for development of agricultural production, food and manufacturing industry. The Energy industry also plays an important role in this region. The hydro-electric dam at Gabčíkovo has produced about 8% of Slovak electricity. [5] In the southern part of the region there is a great potential for geo-thermal water, with 19 geo-thermal wells currently there.

The Győr-Moson-Sopron county in Hungary plays a very important economic role with most industry branches reporting higher than average values. Industry production which contributes 40% of the GDP clearly dominates the county. Agriculture providing a large scale of food production is also well developed. The two major wine-growing areas of Pannonhalmai and Sopron are in this region which is also characterized by large supplies of geothermal water and well-developed tourism.

The Danube Triple Euro-region was established to improve the living standards of its people, to strengthen neighborhood relations and to develop cross-border cooperation. Based on these objectives, the Euro-region has accomplished a number of activities during its existence. A complex network of cycle routes following the international Danube cycle tour route was built and a network of waterways which helped develop boating and water sports was created. Projects to promote cross-border economic and cultural cooperation were developed and also projects for strengthening human resources and reducing unemployment within this region. Additional important activities included the Slovak Euro-region municipal implementation of internet communication and the Euro-region promotion of garden architecture at the international exhibition in Germany as can be seen in Table. 3. All these activities were financed within the cross-border programme and the state budget.

Despite the positive impact of the Euro-region on all aspects of life, especially in the Slovak part of this region, there are also some negatives which prevent its further development. In particular, these include the inability to utilize human, natural and economic resources, the poor promotion and marketing of this region, the lack of harmonization of organizations and institutions on both sides of the Euro-region and especially the lack of adequate funding.

CONCLUSION

Relations between the Hungarian county seat of Győr and Slovak districts with a majority of Hungarian national citizens remain extremely active. Euro-regional cooperation contributes to economic growth and cultural development and it significantly affects most spheres of life in this region. We can certainly

expect that cross-border cooperation will be a significant developmental strategy for these borderland territories within the next few years.

Tab. 3 Projects accomplished in the Danube Triple Euro-region

Year	Project	Description
2001	**Project Info- range**	The first regional cross/border database of environment data
	Reform of public administration	Document
	Measure for next mutual trust	Support of internet relationship - project
2002	**Program document of Danube Triple Euro-region**	Document
2003	**Danube branches system**	Project for supporting Danube river tourism
	Exhibition IGA	Promotion at the international exhibition of garden architecture in Rostock
	Csallóköz–Mátyusföldi cycle route	Cycle route development
2005	**Development initiatives to expand local employment opportunities in Šamorín**	Analysis of the needs of small entrepreneurs in the town and its surrounds
	Constructing a model of separate collection of the waste	Construction of the separation-recycling yards
2006	**Network creation for strengthen economical and cultural cooperation**	Euro-region web site creation
	Internetizsation of Csallóköz–Mátyusföldi Association	Municipalities internet connection
2008	**Reconstruction of amphitheatre Pomlé**	
	Modernization of closely track railway Ponvágli	
2009	**Tramp together**	Publication about Žitny Island
2010	**Development of water tourism on Upper Žitný Island**	Creation of GPS applications for navigable waterways

Source: Internal materials of Danube Triple Euro-region

Acknowledgement: This paper was created thanks to the financial support of VEGA grant No. 1/0454/09 titled "Regional disparities in the context of regional development: analysis of their formation and moderation".

REFERENCES

[1] HALÁS, M.: Development of Cross- border Cooperation of Euroregions in the Slovak Republic. Moravian Geographical Reports, Vol. 15, No. 1, 2007. ISSN 1210-8812, pp. 21-32

[2] PERKMANN, M.: 'The rise of the Euroregion. A bird's eye perspective on European cross-border co-operation', published by the Department of Sociology, Lancaster University, Lancaster LA1 4YN, UK 2002 available at http://www.comp.lancs.ac.uk/sociology/papers/Perkmann-Rise-of-Euroregion.pdf [cit. 10.8.2011].

[3] VILÁGI, A., STRÁŽAY, T., BENČ, V.: Analýza cezhraničnej spolupráce a rozvoja prihraničných regiónov s krajinami V4 a definovanie priorít cezhraničnej spolupráce pre predsedníctvo SR vo V4. Bratislava: Výskumné centrum Slovenskej spoločnosti pre zahraničnú politiku, 2006 avialable at http://www.sfpa.sk/dokumenty/publikacie/132 [cit. 7.6.2011].

[4] RAJČÁKOVÁ, E., ŠVECOVÁ A.: Regionálne disparity v kontexte regionálnej politiky v SR 13th International Colloquium on Regional Sciences. - Brno: Masarykova Univerzita, 2010. - ISBN 978-80-210-5210-9. - S. 33-41

[5] LELKEŠ, G.: Slovensko-maďarská aglomerácia v okolí Bratislavy: Hospodárstvo regiónu. Györ-Šamorín. 2010. avialable at http://www.foruminst.sk/publ/egyeb/agglonetszlov/agglonet_gabor-lelkes.pdf [cit. 10.7.2010].

Euroregionálna spolupráca na príklade Euroregiónu Dunajského Trojspolku

Euroregionálna spolupráca zohráva dôležitú úlohu nielen v rámci rozvoja Slovenska a Maďarska. Výrazne zasahuje do mnohých sfér života, a preto možno očakávať, že sa bude v najbližších rokoch používať ako prioritný nástroj rozvoja prihraničných území štátov. Cieľom príspevku je poukázať na možnosti aktívnej euroregionálnej spolupráce, ktorej príkladom je aj Euroregión Dunajského Trojspolku.
Euroregión počas svojej existencie zrealizoval viacero aktivít. Vybudoval komplexnú sieť cyklotrás, vytvoril sieť vodných ciest pre rozvoj vodnej turistiky a vodných športov. Zrealizovali sa projekty na podporu hospodárskej a kultúrnej spolupráce a projekty na posilnenie ľudských zdrojov a zníženie nezamestnanosti v regiónoch. Medzi najvýznamnejšie aktivity patrila internetizácia obcí na slovenskej strane Euroregiónu a propagácia samotného Euroregiónu na medzinárodnej výstave v Nemecku. Pozitívny vplyv Euroregiónu sa prejavuje vo všetkých stránkach života a bývalá periférna, marginalizovaná oblasť Slovenska sa aj vďaka o niečo vyspelejšej ekonomike maďarskej časti Euroregiónu a vzájomnej spolupráci, stáva ekonomicky aj kultúrne rozvinutou krajinou.

IMPACT OF ECONOMIC CRISIS ON UNEMPLOYMENT IN SLOVAK REGIONS AS AN EXPRESSION OF REGIONAL DISPARITIES

František Križan, Viliam Lauko, Daniel Gurňák

Department of Regional Geography, Protection and Planning of the Landscape

Mlynská dolina, 842 15 Bratislava

krizan@fns.uniba.sk, lauko@fns.uniba.sk, gurnak@fns.uniba.sk

Abstract: *The aim of this paper is to analyze unemployment in the Slovak region in relation to the economic crisis and to identify regions with extreme manifestations of this phenomenon. Unemployment was analyzed in the context of the economic crisis and increasing or decreasing regional disparities in Slovakia.*

Key words: *unemployment, the economic crisis, disparities, Slovakia*

INTRODUCTION

Regional disparities are interdisciplinary and they have multifaceted themes with variable manifestations in time and space. Some manifestations of this phenomenon of disparity can be considered as stable with small variations in transport infrastructure and motorisation and crime, while othes are changed by various exogenous or endogenous factors including unemployment, household income and housing.

Regional disparities in the context of the transformation processes have been an object of study for more than two decades in Slovak geography. This issue in disparities is almost exclusively focused on the phenomenon of unemployment, where the unemployment rate is one of the most frequently monitored indicators of disparities (Rajčáková and Švecová 2009, Švecová and Rajčáková 2010). A different group of papers assesses regional disparities in the context of different socio-economic indicators (Korec 2005, Matlovič et al. 2008, Michael et al. 2010, Rajčáková 2006).

This paper builds on previous studies by V. Lauko, F. Križan, D. Gurňák (2009); V. Lauko, D. Gurňák, F. Križan (2010) and F. Križan, V. Lauko, D. Gurňák (2010), which evaluated the spacial-temporal aspects of unemployment in Slovakia during the pre-crisis compared to the post-crisis period. Signs of economic crisis in the context of the registered unemployment rate in the initial phase were registered only at the beginning of 2009 (cf. Lauko et al. 2009). After this, the unemployment economic crisis and its regional development impact were apparent not only throughout Europe, but also in a global context.

The question which arises is whether the economic crisis was caused by the reduction in regional Slovak disparities, as claimed by many politicians, or if regional disparities are indeed increasing in Slovakia?

The aim of this paper is to describe the registered unemployment rate in Slovakia in recent years in the context of expressions of economic crisis, in order to identify regions with extreme manifestations of this phenomenon.

DEVELOPMENT OF UNEMPLOYMENT RATE

Spatial distribution of unemployment for selected years in Slovakia is documented in Fig. 1 (cf. Križan et al. 2010). Two zones in Slovakia can be compared for the evaluation in all time intervals. The north-western part of Slovakia has low levels of unemployment, while districts including Rimavská Sobota, Revúca and Kežmarok registered maximum unemployment rates. Although the most northern Slovak macro regions of Námestovo Kysucké Nové Mesto appear to be higher enclaves of unemployment, Kosice and the south-eastern districts also register high unemployment.

On 31st March 2011, the overall rate of unemployment in Slovakia was 13.13% and this amounts to 392,483 unemployed people. At the NUTS III level, Prešov, Košice and Banská Bystrica registered the highest unemployment levels, while the lowest values were typical for the western national areas of Bratislava and Trnava. (Table 1)

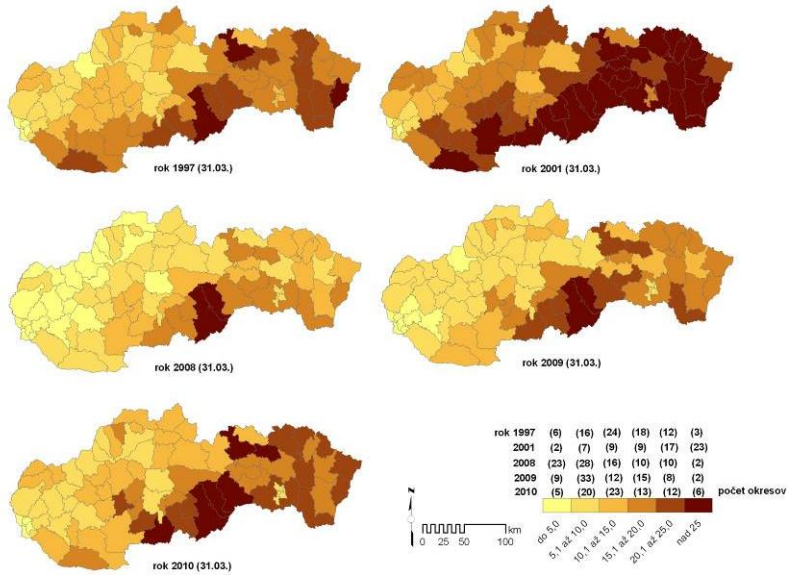


Fig. 1: Development of unemployment rate in Slovak regions during the years 1997, 2001, 2008, 2009 and 2010.

Tab. 1: Selected unemployment indicators in Slovak regions (31st March, 2011)

Indicator/NUTS III region	**BA**	**TT**	**TN**	**NR**
Number of unemployed	18 060	28 610	32 393	47 605
Level of registered unemployment [%]	4,98	8,52	9,65	12,45
Indicator/NUTS III region	**ZA**	**BB**	**PO**	**KE**
Number of unemployed	41 917	68 501	81 599	73 798
Level of registered unemployment [%]	11,65	19,69	18,51	17,95

Source: www.upsvar.sk. NUTS III regions: BA – Bratislavský, TT – Trnavský. TN – Trenčiansky, NR – Nitriansky, ZA – Žilinský, PO – Prešovský, KE – Košický.

At the NUTS IV level, districts with the highest unemployment are localized in the south of central Slovakia and in eastern Slovakia (Fig. 2). In addition to the "record" districts with an unemployment rate above 30% (34.6% Rimavská Sobota and Revúca 30.5%), there are also in this area other districts with unemployment rates above 25%, including Rožňava 28.31%, Veľký Krtíš 25.36%, Trebišov 25.74%, Kežmarok 26.85% and Sabinov 25.66%. Other districts with a level of registered unemployment above 20% are also localized

in this area: Žarnovica, Krupina, Lučenec, Poltár, Košice okolie, Vranov nad Topľou, Sobrance and Medzilaborce. Therefore, the only isolated area with unemployment lower than the regional average in this territory is Košice, where the unemployment rate varies between 8.52 and 9.84%.

Conversely, the western and north-central parts of Slovakia have significantly lower unemployment. The lowest unemployment rate level is in capital city districts (3.45-4.77%) and their associated districts: Pezinok (6.32%), Senec (6.38%) and Malacky (7.59%). With the exception of Galanta (6.97%), other districts with an unemployment rate below 8% are concentrated along the main communication axis in Slovakia, called the Považská axis of growth. These districts are: Trnava, Piešťany, Nové Mesto nad Váhom, Trenčín, Ilava and Púchov.

The development of unemployment during the economic crisis once again highlighted the differentiation between the Slovakia of "the rich north and poor south-east", which was also identified in the studies by V. Lauko et al. (2009), V. Lauko et al. (2010), F. Križan et al. (2010), and also the papers of E. Rajčáková and A. Švecová (2002) and P. Korec (2005).

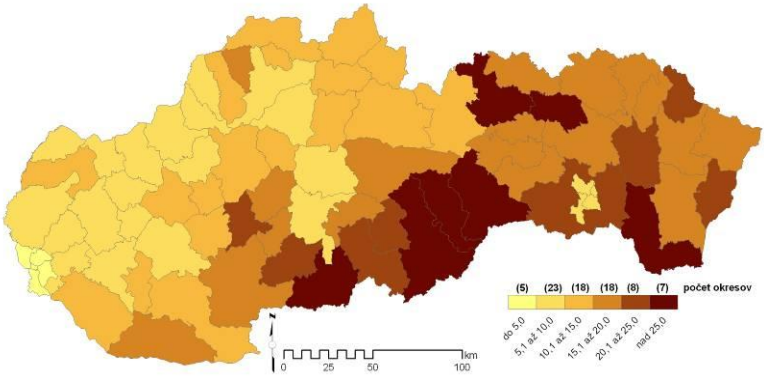


Fig. 2: The level of unemployment rate in Slovak regions (31st March, 2011).

DEVELOPMENT OF THE UNEMPLOYMENT GROWTH RATE INDEX

The unemployment growth rate index was also evaluated as an additional indicator for unemployment development in the selected years, because this reflects the relative changes in unemployment rates during the analyzed period. (cf. Lauko et al. 2009)

Figure 3 shows the trend of the index rise in unemployment in the context of assessments of registered unemployment. While an increase in unemployment was recorded between 1997 and 2001 in all except two districts, the period between 2001and 2008 was characterized by a decline in unemployment in all Slovak regions, and this was reflected in the index figures .

Although unemployment in the Eurozone began to rise significantly due to the economic crisis in March 2008, there was a delay before Slovakia experienced this rise, albeit with various regional disparities (cf. Lauko et al. 2009, Križan et al. 2010). In connection with unemployment growth between 2008 and 2010, significant unemployment growth mainly occurred in western Slovakia, and the highest index values of over 200% were observed in Ilava, Trenčín, Skalica and Malacky. Higher index values were characteristic for Považie which is regarded as Slovakia's traditional industrial region. Conversely, the smallest rates of index were characteristic for districts with traditionally high rates of unemployment, such as Rimavská Sobota, Revúca and Kežmarok (Lauko et al. 2009).

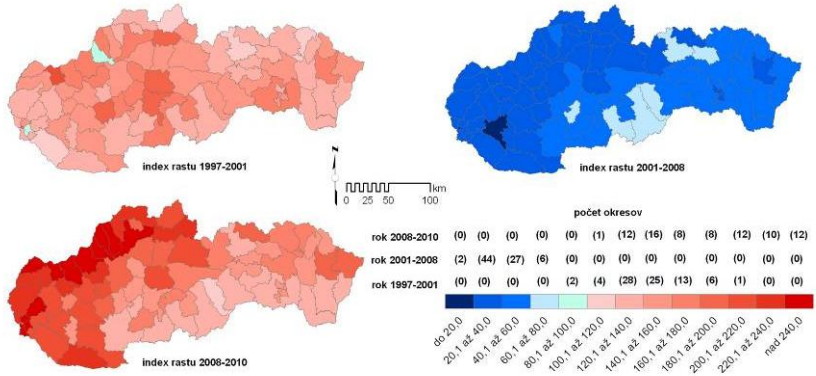


Fig. 3: Development of unemployment growth rate index in Slovakia.

The spatial distribution of unemployment growth rate index between 2008 and 2011 shown in Fig. 4 confirms that the spatial distribution does not conform with the registered unemployment rate (Fig. 2). The lowest values, with an index below 140, were recorded in the southern districts of both Central and Eastern Slovakia: At Veľký Krtíš, Lučenec, Rimavská Sobota, Revúca, Banská Štiavnica, Gelnica, Košice okolie, Michalovce, Medzilaborce and Kežmarok. In contrast, the highest index growth of over 240 was identified in the suburbs of Bratislava and its surrounds, including Pezinok and Senec, and also in the Považie districts of Trenčín, Ilava, Považská Bystrica, Žilina and Čadca. Here

again, there is a dividing line between the north-western and south-eastern areas of Slovakia, but this is in the opposite direction. From first impressions, we can refute the erroneous conclusion of some politicians that this crisis affects more advanced regions, and reduces regional disparities. However, the reality is entirely different since differences in unemployment rates for individual districts are quite apparent.

An example of this is the Revúca district, which had an index level of only 119.65 between 2008 and 2011 and the unemployment rate rose during this period by 5.01 percentage points (Table 2), while the district of Bratislava II with an index level of 326.71 for the same period registered an unemployment rate increase of 3.31 percentage points. The difference between the districts with the highest unemployment rate (Rimavská Sobota 26.40%) and Bratislava I district with an unemployment rate of 1.30% in 2008 was 25.10 percentage points. The difference between the unemployment rates of these two districts after 3 years of crisis, rose to 31.17, denoting an increase of 6.07 percentage points!

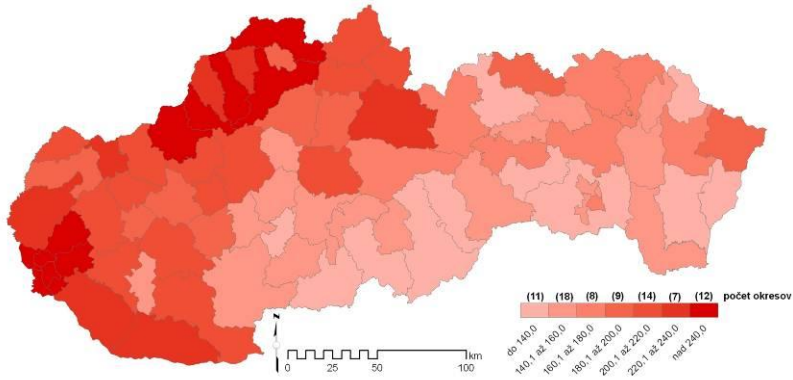


Fig. 4: Development of unemployment growth rate index in Slovakia between 2008–2011.

Tab. 2 Trends of level of unemployment rate (U) and unemployment growth rate index (UGI) in selected regions of Slovakia in 2008 and 2011.

District	U_1 [31.03.2008]	U_2 [31.03.2011]	U [U_2–U_1]	UGI
Bratislava I	1,30	3,45	2,15	265,38
Bratislava II	1,46	4,77	3,31	326,71
Bratislava III	1,40	4,19	2,79	299,29

District	U_1 [31.03.2008]	U_2 [31.03.2011]	U $[U_2–U_1]$	UGI
Bratislava IV	1,37	4,03	2,66	294,16
Bratislava V	1,48	4,37	2,89	295,27
Revúca	25,49	30,50	5,01	119,65
Rimavská Sobota	26,40	34,62	8,22	131,14
Kežmarok	19,38	26,85	7,47	138,54
Sabinov	16,85	25,66	8,81	152,28

Source: www.upsvar.sk

REFERENCES

[1] KOREC, P. Regionálny rozvoj Slovenska v rokoch 1989-2004. Bratislava: Geografika, 2005, 228 s., ISBN 80-969338-0-9.

[2] KRIŽAN, F., LAUKO, V., GURŇÁK, D. Vybrané aspekty prejavov ekonomickej krízy v kontexte nezamestananosti v regiónoch Slovenska. In Klimová, V. (ed.): 13th International Colloquium on Regional science. Brno: Masarykova univerzita, 2010, s. 109–117.

[3] LAUKO, V., GURŇÁK, D., KRIŽAN, F. Časovo-priestorové zmeny nezamestnanosti ako prejav regionálnych disparít na Slovensku. In Fňukal, M. et al. (eds.): 50 let geografie na Přírodovědecké fakultě Univerzity Palackého v Olomouci. Olomouc: Přírodovědecká fakulta Univerzity Palackého v Olomouci, 2010, s. 493–411.

[4] LAUKO, V., KRIŽAN, F., GURŇÁK, D. Časovo-priestorové aspekty nezamestnanosti na Slovensku v procese ekonomickej transformácie a krízy. In Klimová, V. (ed.): XII. mezinárodní kolokvium o regionálních vědách. Brno: Masarykova univerzita, 2009, s. 58–65.

[5] MATLOVIČ, R., KLAMÁR, R., MATLOVIČOVÁ, K. Vývoj regionálnych disparít začiatkom 21. storočia na Slovensku vo svetle vybraných indikátorov. Regionální studia, 2008, č. 2, s. 2–12.

[6] MICHAELI, E. A KOL. Regionálny rozvoj pre geografov. Prešov: Vydavateľstvo Prešovskej univerzity, 2010, 712 s., ISBN 978-80-555-0065-2.

[7] RAJČÁKOVÁ, E. Regionálne disparity na Slovensku - vývoj a súčasný stav. Geografická revue. roč. 2, 2006, č. 2, s. 425–448.

[8] RAJČÁKOVÁ, E., ŠVECOVÁ, A. Regionálne disparity na Slovensku. Geographia Cassoviensis, roč. 3, 2009, č. 2. s. 142-147.

[9] ŠVECOVÁ, A., RAJČÁKOVÁ, E. Regionálne disparity nezamestnanosti na Slovensku. In Klimová, V. (ed.): 13th International Colloquium on Regional Sciences. Brno: Masarykova Univerzita, 2010, s. 118-125.

Acknowledgement: This paper was created thanks to the financial support of VEGA grant No. 1/0454/09 titled "Regional disparities in the context of regional development: analysis of their formation and moderation".

Dopady ekonomickej krízy na nezamestnanosť v regiónoch Slovenska ako prejav regionálnych disparít

Výsledky nášho príspevku potvrdili niektoré dôležité skutočnosti. Ekonomická kríza spôsobila rast nezamestnanosti vo všetkých regiónoch Slovenska. Výsledná miera nezamestnanosti v roku 2011 je však v rôznych regiónoch rôzna. Opäť vznikla výraznejšia diferenciácia medzi "bohatším severozápadom a chudobnejším juhovýchodom", pričom deliaca čiara trvalo prebieha zhruba v smere Komárno – Poprad. Napriek tomu, že okresy s najvyššou mierou nezamestnanosti vykazujú najnižšie indexy rastu miery nezamestnanosti, a okresy s najnižšou mierou nezamestnanosti najvyššie indexy rastu miery nezamestnanosti, nedochádza ku konvergentnému vývoju. Aktuálny vývoj nezamestnanosti potvrdzuje výsledky našich predchádzajúcich výskumov, že hospodárska kríza spôsobuje na Slovensku zväčšovanie regionálnych disparít!

REGIONAL DEVELOPMENT AND UNEMPLOYMENT IN SLOVENIA

Slavomír Bucher, René Matlovič

Department of Geography and Regional Development

Faculty of Humanities and Natural Sciences, University of Prešov, ul. 17. novembra 1, 081 16 Prešov

slavobucher@yahoo.com

Abstract: *There are great economic disparities in labor market of Slovenia. This work analyses them on the basis of several unemployment indicators: unemployment rate, value of per capita GDP, long-term unemployment, unemployment rates vs. level of education, unemployment gender ratio. The statistical units have made the observation framework. The analysis results show that there is pronounced relations core-periphery in Slovenia.*

Key words: *Slovenia, labor market, unemployment indicators, structure of unemployment, education level, regional development*

INTRODUCTION

The regional disparities (economic, social, etc.) within the post-communist countries are largely discussed (directly or indirectly) in scientific literature (Korec, 2003). Several studies underlined a crucial role of human development and capital (knowledge and education skills) in social-economic transformation (Schultz, 1964). Some authors like Bojnec ET. AL. (2003 and 2005) showed that the attained level of education labor in Slovenian agriculture is relatively low, but human capital plays an important role in mobility and flexibility of labor. Several authors claim that an economic disparity in post-communist countries was created at the very beginning of the transformation period. Matlovič, Klamár, Matlovicova (2008) divided Slovakian regions according to socio-economic performance, which has been expressed by the value of per capita GDP, unemployment rate as well as other significant indicators.

Therefore it is not surprising that unemployment represent a major indicator of social-economic development of region. Newly formed independent and autonomous countries among which is Slovenia are engaged with process of forming their national economies, which require a stable legal order and balanced economic development and flexible labor market. Several authors like Michalek (1994), Basco (2008, 2009) state strong connection between unemployment and poverty or low quality of life. It is clear that unemployment means if you do not have the support for what you need for living, such as money to buy foods, to pay facilities fees, or even to keep warm in cold days. That means materially poor. Besides, unemployment makes people frustrated for lack of sense of identity. This is the mentally poverty.

On the other hand Dzupinova, Hornak and Rochovska (2008) allege that unemployment rate (including long-term unemployment) can be used for identify of periphery regions. Rajcakova and Svecova (2010) show regions in the context of relations between education level and rate of unemployment.

In the light of this overwhelming concern with the unemployment rate, the considerable significance of unemployment duration for an understanding of the social consequences of unemployment should not be forgotten. In an attempt to redress the balance, long-term unemployment (defined as unemployment duration to one year or more) is considered here as a more sensitive indicator to be taken into account for the direction of government regional policy aid.

The occurrence of a high proportion of long-term unemployed is evidence of profound disfunction in a local labor market area. It indicates that a substantial section of the labor force ‘surplus to the requirements’ of local employers (Green, 1984).

SLOVENIA BY STATISTICAL REGIONS

Slovenia is in a group of smaller European countries by the size of population (a little bit more than 2 million) and the size of area (20.273 km^2). At the NUTS 3 Slovenia is divided into the 12 statistical regions. Central Slovenia and Drava region by the population are the largest statistical regions in Slovenia. It is caused because in Central Slovenia is located capital of Slovenia – Ljubljana, which is the largest city in the country and in the region of Drava is lying second largest city in Slovenia – Maribor. Relatively decreased of population in the last two decades has been observed in the north-eastern part of Slovenia. On the other hand gradual increased or remained of population have been observed in the central and western parts of Slovenia. The statistical regions with the decline of population also experienced the highest rates of registered unemployment. Comparison of indicators showed us that average monthly gross salaries in statistical regions of Slovenia are strongly and significantly associated with the level of economic development measured by the GDP per capita.

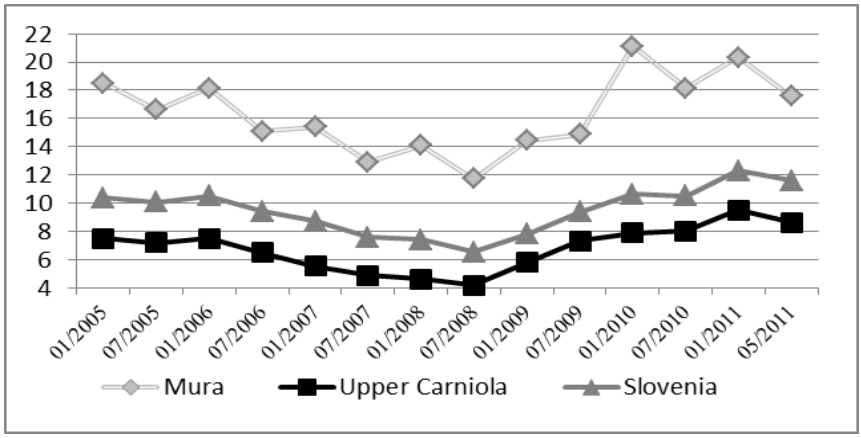


Fig. 1: Unemployment rate (%) 2005–2011 by the statistical region with lowest and highest values in Slovenia
Source: STATISTICAL OFFICE OF THE REPUBLIC OF SLOVENIA, 2011

According to the Labor Force Survey the unemployment rate in Slovenia was below European average.

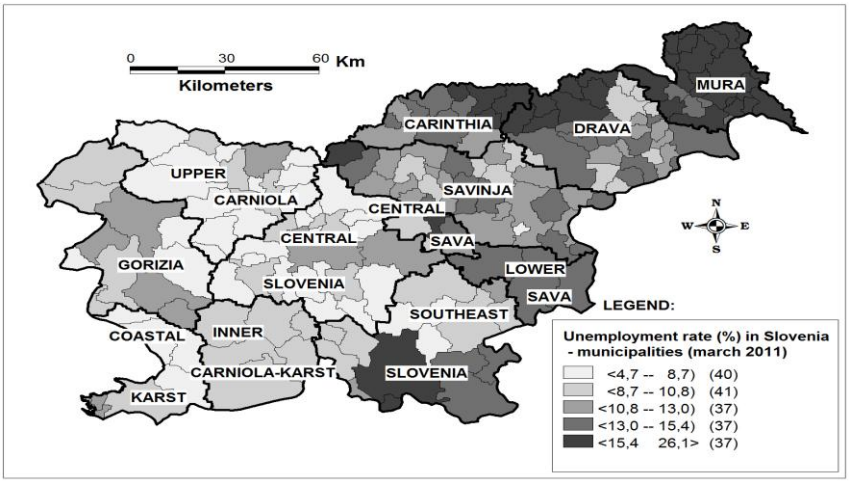


Fig. 2: Unemployment in Slovenia, 2011
Source: authors

The total unemployment rate in May 2011 was 8.6 %, which was 1.3 and 0.7 percentage points below the euro area (EA17) and EU 27 averages, respectively.

REGIONAL DIFFERENTIATION OF UNEMPLOYMENT IN SLOVENIA AT THE MID OF 2011

UNEMPLOYMENT RATE BY EDUCATION ATTAINMENT

A major benefit of education is the lower risk of unemployment at higher educational levels. It may not be surprising that people who possess university degrees make more money and have a much lower unemployment rate than those who did not graduate from high school.

The highest share of unemployed persons without school education or with primary education in total unemployed persons in July 2011 was recorded in following statistical regions: Southeast Slovenia (48.2 %), Mura (45.9 %), Lower Sava (40.8 %), Inner Carniola-Karst (38.5 %) and Central Sava (37.8 %). All of these regions have had share of unemployed persons without or with primary education higher than national average.

The highest share of unemployed persons with university education in July 2011 in total unemployed persons has been observed in following statistical

regions: Central Slovenia (15.9 %), Gorizia (15.9 %), Upper Carniola (14.0 %), Carinthia (13.4 %) and Coastal-Karst region (13.3 %). All of these regions have had share of unemployed persons with university education higher than national average.

There is strong correlation between proportion of people with lowest level of education and unemployment rate. For example, Mura region which is located in north-east part of Slovenia has had the highest unemployment rate and highest share of population without school education and with primary education per 100 inhabitants older than 15 years. On the other hand, Coastal-Karst region and Central Slovenia region which are located in south-west part of Slovenia have had the lowest unemployment rate and highest share of population with upper education and university education per 100 inhabitants older than 15 years.

The reasons for the East-West distribution of unemployment rates can be mainly attributed to different patterns of economic activity in the former system as well as different pace of restructuring after the economic transformation. Namely, in the former system eastern regions were characterized by a large share of manufacturing activities specifically specialized in labor intensive industries, such as textile industry, automobile industry etc.

When restructuring took place many manufacturing companies were abolished, leaving behind huge members of unemployed workers, who had difficulties in finding new jobs due to at least two reasons: (1) required qualification in other sectors and (2) the problem of overall lower labor demand (Boršič, Kavkler, 2009).

REGIONAL UNEMPLOYMENT DISPARITIES IN STATISTICAL REGIONS OF SLOVENIA

The different capability of particular regions is a consequence of the above mentioned factors of regional development of Slovenia. We used the following criteria to compare disparities of the regions in terms of unemployment: share of unemployed persons at age 25 or less in total unemployed population, unemployed persons without school education, or with primary education in total unemployed population, share of unemployed women in total unemployed population, share of long-term unemployed persons in total unemployed population, unemployment rate and GDP per capita in EURO (current rate).

We used following formula for calculating unemployment disparities:

$$I_{xi} = \frac{(X_{max} - X_i)}{(X_{max} - X_{min})}$$

If decreasing X_i agrees with the favorable state of observed phenomenon

$$I_{xi} = \frac{(X_i - X_{min})}{(X_{max} - X_{min})}$$

If increasing X_i agrees with the favorable of state of observed phenomenon

Classification of statistical regions in Slovenia according to their unemployment disparities is as the following:

I. Category: successful (low unemployment, high GDP per capita) regions: Upper Carniola (total score 0.898), Central Slovenia (0.892), Coastal-Karst region (0.861) and Gorizia region (0.842).

II. Category: regions with potential to be successful: Inner Carniola-Karst region (0,725), Savinja (0,564), Drava (0,559) and Central Sava region (0,528).

III. Category: unsuccessful (depressed) regions with high level of unemployment, low GDP per capita: Lower Sava (0,508), Carinthia (0,464), Southeast Slovenia (0,455) and Mura region (0,138).

The concentration of service activities, opportunities for jobseekers, particularly budgetary financed public services are largely concentrated in Central Slovenia, Coastal-Karst region, Gorizia (due to job opportunities in Italy) and Upper Carniola. Ljubljana as a capital city has several characteristics of region with the level of economic and social development approaching the EU average. Economic differences create gab between western, eastern and middle parts of Slovenia (Central Slovenia) suggest a need for potentially sub regional specific structure and regional development policies consistent with the EU objectives.

REFERENCES

[1] BASCÓ, P., DUBCOVÁ, A. Unemployment as a quality of life indicator (in Sturovo ward). In: *Geoinformation* {online}, 4/2008. Dostupné na internete http://www.kgrr.fpv.ukf.sk/geoinfo/publikacie.htm. ISSN 1336-7234.

[2] BASCÓ, P. Chosen particularities of the unemployment in Sturovo ward. Geografické aspekty středoevropského prostoru. 1. Díl. Brno: Masarykova univerzita, 2009, s. 121-129. ISBN 978-80-210-4947-5.

[3] BOJNEC, Š. Wage Formation during Economic Transformation: Macro-economic Facts and Firm-survey Evidecnce from Slovenia, Post-Communist Economies, 2003, 15 (4): forthcoming. ISSN 1465-3958.

[4] BOJNEC Š. Labour market characteristics by sectors and statistical regions in Slovenia and their policy relevance. Jahrbuch der Österreichischen Gesellschaft für Agrarökonomie, 2005, Vol. 13, pp. 195-210. ISBN 3-85076-716-7.

[5] BORŠIČ, D., KAVKLER, A. Duration of Regional Unemployment Spells in Slovenia. Managing Global Transitions: International Research Journal. Volume 7 – Number 2 – Summer 2009. ISSN 1854-6935.

[6] DŽUPINOVÁ, E., HORŇÁK, M., ROCHOVSKÁ, E. Vybrané problémy periférnych území Slovenska (interpretácia výsledkov terénneho výskumu vo vybraných perifériách). In: Džupinová, E., Halás, M., a i. Periférnosť a priestorová polarizácia na území Slovenska. Bratislava: Geografika, 2008, s. 137-174. ISBN 978-80-89317-06-6.

[7] GREEN, A. E. Considering Long-Term Unemployment as a Criterion for Regional Policy Aid. Published by: Blackwell Publishing on behalf of The Royal Geographical Society (with the Institute of British Geographers). Vol. 16, No. 3., 1984, pp. 209-218.

[8] KOREC, P. Population development, urbanization and regional disparities of Slovakia. ACTA UNIVERSITATIS CAROLINAE, 2003 GEOGRAPHICA, No. 1, PAGE 167-180. ISBN 80-246-0981-9.

[9] MATLOVIČ R., KLAMÁR R., MATLOVIČOVÁ K. Development of regional disparities in Slovakia at the beginning of 21st. century based on the selected indicators. Regionální studia / Czech Regional Studies, 02/2008, p. 2-12. ISSN 1803-1471.

[10] MICHÁLEK, A. Meranie chudoby v regiónoch (okresoch SR). In: Sociológia, roč. 36, 2004, č. 1, s. 7-30. ISSN 0049-1225.

[11] SCHULTZ, T. W. Transforming Traditional Agriculture. New Haven, 1964 Conn.: Yale University Press.

[12] STATISTICAL OFFICE OF THE REPUBLIC OF SLOVENIA. Slovene regions in figures. 2011, p. 73. ISSN 1854-3527.

[13] ŠVECOVÁ, A., RAJČÁKOVÁ, E. Unemployment and educational level of Slovak population. Sborník příspěvku z konference 50 let na geografie Přírodovědecké fakultě UP v Olomouci (10.-11. 6. 2009), 1. vyd. Olomouc, s. 601-611. ISBN 978-80-244-2493-4.

Acknowledgement: This paper was prepared with the contribution of the grant VEGA No. 1/0611/09 „The Construct of a Place in Regional Geographical Analysis and Synthesis Territorial Marketing: A Theoretical and Methodological Framework and Its Application to Selected Model Areas (Project Leader: Prof. R. Matlovič).

Vývoj nezamestnanosti vo vzťahu k vzdelanostnej úrovni obyvateľov Slovinska

Snahou príspevku je poukázať na špecifiká pri meraní nezamestnanosti ako významného faktora vplývajúceho na sociálno-ekonomickú situáciu regiónov. Modelové územie predstavovali štatistické regióny (NUTS III) Slovinska. Na základe porovnania jednotlivých typov nezamestnanosti môžeme konštatovať výrazné disparity medzi juhozápadnou a severovýchodnou časťou štátu. Tieto rozdiely sú ovplyvnené nedostatkom pracovných príležitostí na regionálnych trhoch práce, nedostatočnou flexibilitou a kvalifikáciou pracovnej sily (hlavne v Korošskom a Pomurskom regióne), ako aj slabou ponukou pracovných príležitostí predovšetkým v sektore priemyslu a služieb.

Na základe tejto analýzy môžeme konštatovať, že vedúce regióny ležiace v juhovýchodnej časti územia (Gorišský, Gorenský, Prímorsko-krašský a Stredné Slovinsko) majú problém s krátkodobou nezamestnanosťou a nezamestnanosťou vysokoškolsky vzdelaných obyvateľov, čo je v kontraste so severovýchodnou časťou územia (Pomurský, Korošský región), v ktorých prevláda dlhodobá nezamestnanosť a nezamestnanosť obyvateľov bez školského vzdelania, resp. iba so základným vzdelaním.

RENEWABLE ENERGY SOURCES AS AN ALTERNATIVE TO THE NEW USAGE OF BROWNFIELDS

Josef Kunc*, Petr Klusáček, Stanislav Martinát**, Petr Tonev***

*Faculty of Economics and Administration

Masaryk Univerzity

Lipová 41a, 602 00 Brno

kunc@econ.muni.cz; tonev@econ.muni.cz

**Institute of Geonics

Studentská 1468/9, 708 00 Ostrava

martinat@geonika.cz; klusacek@geonika.cz

Abstract: *The subject of brownfields has recently become a widely discussed issue. The number of abandoned and unused facilities in the Czech Republic is quite large, which results in a number of problems. Typical example of a revitalization is a complex demolition or renewable which would give the place in question a new function. (business, administrative, residential, free-time..). Another typical example is a revitalization of the object or the area while keeping some of its original construction*

and functional features. An example of an "alternative solution" is to make use of brownfields in a way that would support the development of renewable sources of energy, especially solar and wind power stations, an activity that can be observed in many countries of the world.

Key words: *brownfields, renewable energy sources, alternative usage, world, the Czech Republic*

INTRODUCTION BRIEF THEORETICAL FRAMEWORK

Old, abandoned, and unused facilities, often polluted – so called brownfields – can be found in many countries of the world which have reached a certain degree of economic development. Mostly in developed countries – and the Czech republic would like to be accounted for a developed country – they are something of a scarf on the face of a town or a countryside. The origin of brownfields is connected with the restructuring of national economy, i.e. the change of agricultural-industrial society into tertiary civil sphere based on services (Greenberg et al., 2001). The aim of our article is to mention existing ways to revitalization in the world as well as in the CR, focusing on "alternative" solutions taking renewable energy sources into account.

There are many ways how to reuse brownfields. Some of these activities are in progress (not) being helped by political will, legal status, and the amount of finance. Some solutions are effective both from economical and social point of view, others may give rise to disputes. The way revitalization is handled also differ according to original usage of brownfields, the size of areas and facilities, the extent of contamination, level of country economy, traditions, etc. (De Sousa, 2001; Kabisch, 2004; Kadeřábková, Piecha et al., 2009 and others). What we are most interested in are the differences in implemented projects caused by location in the landscape, i.e. the contrast between town and country environment.

In the countryside, i.e. open landscape, the most frequent types of brownfields are agricultural ones (Věžník a Svobodová, 2009), some types of military ones (large military airfields, e.g. Šilnánková et al., 2006) or industrial ones (mining areas). Brownfields in urban environment are, possibly because of the fact a significant number of people are aware of them (Klusáček et al., 2009; Kunc et al. 2011), more important for the "man – environment – life quality" relationship. Urban environment is thus the environment that provides us with industrial (factories as well as excavation and mining areas, De Sousa, 2001; Vojvodíková, 2005; Sýkorová, 2007), military (town military barracks, Kuda a Smolová, 2007), transport (railway stations, parking lots), and residential brownfields, as well as many others.

BROWNFIELDS AND ALTERNATIVE SOLUTIONS IN THE WORLD

What is meant by alternative utilization of brownfields? Our article deals with brownfields and renewable energy sources, which could look like a bit strange idea. Let us imagine it. Vacant houses and premises can be demolished, put to the ground. The soil which have been exploited for decades is often contaminated and thus if of any use for e.g. agricultural purposes or residential site, etc., then only after huge investments on decontamination.

Environmental Protection Agency of the USA (EPA) lists (http://www.epa.gov) hundreds of brownfield sites. These are divided according to individual states or according to overwhelming possibilities of future utilization with respect to five types of renewable energy sources, which are: wind, solar, biomass, geothermal and landfill gas. In this way general public as well as a potential investor can get basic information concerning these locations.

One of the areas with a considerable amount of abandoned facilities is the vast Appalachian Mountains range spreading for 3 thousand km from South to North in the eastern part of the USA. Although this well known region has already exploited its coal mining potential, there still exist possibilities for alternative usage of the area. EPA takes part in supporting wind, solar, and biofuel refineries up and down the abandoned mining areas in the Appalachians[8].

Fig. 1: Wind power station in Somerset (Pennsylvania) in the place of an abandoned coalmine and solar panels in the brownfield in Brockton (Massachusetts)
Source:
http://www.epa.gov/reg3hwmd/bf/lr/newsletter/2009Spring/renewable_energy_mining.html

[8] http://www.epa.gov/reg3hwmd/bf-lr/newsletter/2009-Spring/renewable_energy_mining.html

Concerning urban areas we can introduce the Solar America Cities project, which recently represents 25 major American cities with solar power stations. One of them is Chicago, where the biggest "city" solar power station in a brownfield in the USA with the capacity of 10 MW is located[9].

One of the biggest solar power stations in a brownfield in the world is in Germany and ranks in the TOP 10 biggest solar power stations worldwide. Solar park Lieberose (south of Berlin, Brandenburg) has a capacity of 53 MW and supplies about 15 000 households. It is planned that this power station should produce energy for about 20 years.

An area of 163 hectares which is recently covered by 560 thousand thin-layer solar panels used to be a military area and Soviet Army troops were trained here 20 years ago. Brandenburg government decided to lease the landplots for 20 years. The money from the landplots lease from the project investors should be used for the ecological remediation of the location, where a protected landscape area should emerge in 20 years. The companies which built the power station have undertaken to completely demolish it after the solar panels expire[10].

Fig. 2: Photovoltaic power station Lieberose in Germany
Source: Flickr.com

[9] http://www.smartplanet.com/blog/cities/cities-lighten-up-brownfields-with-solar-panels/416

[10] http://www.nazeleno.cz/energie/fotovoltaika-1/5-nejvetsich-slunecnich-elektraren-na-svete.aspx

BROWNFIELDS AND ALTERNATIVE SOLUTIONS IN THE CZECH REPUBLIC

The interest in the brownfields issue in the Czech Republic started some 15 years ago, several decades later than in the world most developed countries. If an individual issue was solved, it mostly took on the traditional form, i.e. demolition or reconstruction of the original facilities and their usage for new commercial purposes. The alternative way of using the brownfields to support the renewable energy sources is highly up to date.

Up to now the investors are interested in photovoltaic devices only because these can be, contrary to wind turbines and biogas stations, mounted on a flat base and can be placed both on vacant areas (former landfills, military areas and airports, and demolished factories areas) and roofs of unused factories or cooperative farms.

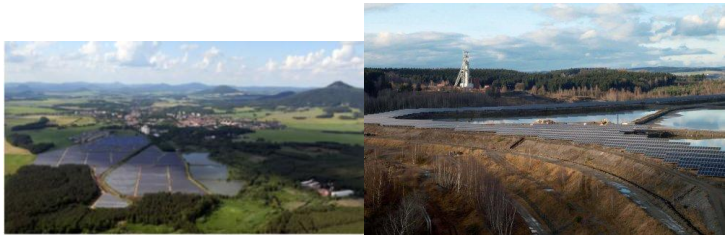


Fig. 3: Solar power station Ralsko Ra 1 in former military area and solar power station Rožná (DIAMO I.) in the area of uranium mining.
Source:http://m.ihned.cz/index.php?article%5Barea;
http://www.realit.cz/clanek/vyuziti-brownfieldu-muze-byt-take-pouze-docasne

Fig. 4: Solar power station Slavkov u Brna (Southern Bohemia) in the place of a former sugar refinery and solar power station Libouchec in Northern Bohemia (former factory AZNP Mladá Boleslav)
Photo: Josef Kunc

Former military area Ralsko (Northern Bohemia) provides ideal space for the installation of solar panels. Recently a power station with a capacity of 38 MW (biggest in the CR) is located here. Its aspiration to become the biggest photovoltaic power station in the world was not, till the government regulation of the purchase prices of electric energy from the photovoltaic power stations this year, only a utopia. Similar suitable location is the uranium mine Rožná (Vysočina region) sedimentation basin, where a remediation is in progress (see figure 3).

In figure 4 you can see a solar power station at the edge of the town of Slavkov u Brna in the place of former sugar refinery whose facilities were demolished and the soil marked as unsuitable for farming. The solar power station in the municipality of Libouchec stands in the place of former engine factory of AZNP Mladá Boleslav right in the middle of residential premises.

CONCLUSION

In the Czech Republic hundreds of brownfields can be found both in urban and rural areas. Their new usage is, similar to North America or Western Europe, difficult for a number of well known reasons. Some new industrial zones, business centres or production lines emerge. Nevertheless, most of the locations are abandoned and falling into disrepair, as there is a lack of finances and political will needed for their revitalization.

During the last three years, following the rise of interest in photovoltaic devices, the interest in abandoned landplots and areas has risen. Today decades of solar power stations located in brownfields can be found, both in the country and at the outskirts of towns where they do not occupy good quality farmland. In the future following usage of brownfields for similar alternative purposes can be expected and, taking into account other countries experience, not only for photovoltaic energy.

Acknowledgments: This article was prepared as a part of the Energy landscapes: inovation, development and internationalisation of research (No: ESF OP CZ.1.07/2.3.00/20.002).

REFERENCES

[1] DE SOUSA, C. A. Contaminated sites management: the Canadian situation in international context. In: *Journal of Environmental Management*, 62, 2, 2001, p. 131–154.

[2] GREENBERG, M., LOWRIE, K., MAYER, H., MILLER, T., SOLITARE, L. Brownfield redevelopment as a smart growth option in the United States. *The Environmentalist* 21, no. 2, 2001, p. 129-143.

[3] KABISCH, S. Revitalization chances for communities in post-mining landscapes. In: *Peckiana*, Band 3, 2004, p. 87-99.

[4] KADEŘÁBKOVÁ, B., PIECHA, M. et al. *Brownfileds. Jak vznikají a co s nimi*. Praha: C. H.Beck, 2009, 138 p.

[5] KLUSÁČEK, P., KREJČÍ, T., KOLEJKA, J., KUNC, J. Možnosti samosprávy a soukromých subjektů při revitalizaci brownfields. In: Nové trendy, nové nápady. 1. vydání. Znojmo: Soukromá vysoká škola ekonomická Znojmo, 2009, p. 500-506ŠILHÁNKOVÁ, V. et al. *Rekonverze vojenských brownfields*. Pardubice: Univerzita Pardubice, 2006, 219 p.

[6] KUDA, F., SMOLOVÁ, I. *Technické a geografické aspekty integrace neprůmyslových brownfieldů do území*. Ostrava: Technická univerzita Ostrava, 2007, 150 p.

[7] KUNC, J., KLUSÁČEK, P., MARTINÁT, S. Percepce a lokalizace urbánních brownfields: podobnosti a rozdíly na příkladu Brna a Ostravy. *Urbanismus a územní rozvoj*, XIV, 1/2011, p. 13-17.

[8] SVOBODOVÁ, H., VĚŽNÍK, A. To the problems of agricultural brownfields in the Czech Republic, case study of the Vysocina region. *Agricultural Economics* 55, 11, 2009, p. 550-556.

[9] SÝKOROVÁ, I. Pražské brownfields: příležitost i hrozba pro rozvoj metropole. In: *Geografie - Sborník České geografické společnosti*, 112, 3, 2007, p. 250–265.

[10] VOJVODÍKOVÁ, B. Colliery brownfields and the master plan of Ostrava. In: *Moravian Geographical Reports*, 13, 2, 2005, p. 49-56.

Obnovitelné zdroje energie jako alternativa nového využití brownfields

Problematika brownfields se stala v posledních letech velmi diskutovanou záležitostí. V České republice je odkaz opuštěných a nevyužívaných objektů a areálů více než patrný a nese s sebou celou řadu problémů. Klasickým příkladem znovuoživení je komplexní demolice či asanace a přidělení nové funkce dané lokalitě (obchodní, administrativní, residenční, volnočasové...). Dalším klasickým příkladem je revitalizace objektu či prostoru při dochování některých původních stavebních i funkčních prvků. Příkladem „alternativního řešení“ je možnost využití brownfields pro podporu rozvoje obnovitelných zdrojů energie, zejména solárních a větrných elektráren, jak se již v řadě zemí světa děje.

POPULATION RETAIL GRAVITY MODEL IN BRNO HINTERLANDS

Josef Kunc*, Bohumil Frantál, Petr Tonev***

*Faculty of Economics and Administration

Masaryk University

Lipová 41a, 602 00 Brno

kunc@econ.muni.cz; tonev@econ.muni.cz

**Institute of Geonics

Drobného 28, 602 00 Brno

frantal@geonika.cz

Abstract: *Commuting to acquire services, or, more specifically, retail services, represents, along with commuting to work and schools, a significant region-forming segment that participates in shaping a functional city system. The following article is a part of a large research work that was performed during 2010. The model area was delineated by the municipalities of the Brno-venkov district, or, more specifically, a 30-minute commuting distance by individual car transportation when overlapping into other districts. The survey attempted to depict the gravity profile of the Brno agglomeration's inhabitants in daily and non-daily shoppings, establishment of secondary commuting centers, popularity of shopping centers at the edge of the city and other aspects.*

Key words: *commuting for retail shopping, retail gravity model, Brno agglomeration*

INTRODUCTION BRIEF THEORETICAL FRAMEWORK

When considering the focus of our article, at the theoretical-methodical level we base our research on the delimitation of centers according to the sizes of the attended area, i.e. according to the service processes among settlements. These are the so-called dynamic characteristics utilizing data from surveys of population's gravity towards the service facility equipment of settlements (Smailes 1967, Scott 1973).

Data on inhabitant's gravity towards communal facilities (retail shops) are used not only for center selection but especially for specifying the range of gravity areas for the individual centers and finding the intensity of relationships between centers and their hinterlands (Maryáš 1983).

Only few authors have performed surveys based on respondent questioning in this country. Maryáš (1983, 1988) is one of the individuals we would like to

highlight since in his unique work from 1988 he used a large questionnaire survey from the turn of the 1970s and 1980s to evaluate the geographical aspects of retailing and communal services distribution in the Czechoslovak Socialist Republic while placing emphasis on the selection of supralocal centers and delimitation of their spheres of influence.

Actual disappearance of data sources after 1990 started a publication-poor period which was ended after the turn of the century by works focused on causal-spatial relationships of the retailing transformation (frequently using selected cities and retail facilities as examples) where the authors also used questionnaire surveys (Tonev 1998, Szczyrba 2000, 2001, 2002).

The model large-area retail stores and emerging shopping centers have come into focus when evaluating geographical (or sociological) aspects of retail gravity into the service centers (Szczyrba 2002, Spilková 2003, Ordeltová and Szczyrba 2006, Mulíček 2007). Szczyrba (2005) is the author of the most extensive and stunning work focused on the development and transformation of the retailing network while taking into account also the retail shopping behavior of the population.

SELECTED SURVEY RESULTS

The survey was performed in 228 municipalities (municipalities of the Brno-venkov district and in the distance of up to 30 minutes from the Brno center); 252,000 inhabitants lived there at the end of 2010. When considering only the 30-minute time isochrone, with which we will work below, then we have 157 municipalities and 214,000 inhabitants. The largest municipality was Kuřim with 10,800 inhabitants and the smallest one Řikonín with 33 inhabitants. The number of respondents reached 6,300 persons, or rather 6,300 filled in questionnaires. When discussing population below, we mean the representative sample of respondents that we apply to this population. The survey, performed with the help of MU students, took place in the form of short controlled interviews; the numbers of addressed people differed according to the sizes of the municipalities from 10 to 100. The target respondent selection was corrected by the sex and age structures according to the South-Moravian Region's average values.

Time and distance required to reach the target of commute may play a significant role when making decisions about commuting for shopping. The 30-minute isochrone is considered to be a commuting distance which people are willing to endure when commuting for shopping beyond their places of residence. All the maps clearly indicate the spatial-temporal elongations flanking motorways and limited-access highways radiating out of Brno and

also the "island" of the Adamov town (5,000 inhabitants) and the surrounding municipalities in the southern part of the Blansko district. This area has very adverse transportation connection to the center of Brno and the car trip to the city's main railway station takes longer then the same train trip due to the natural barriers (the deep valley of the Svitava river).

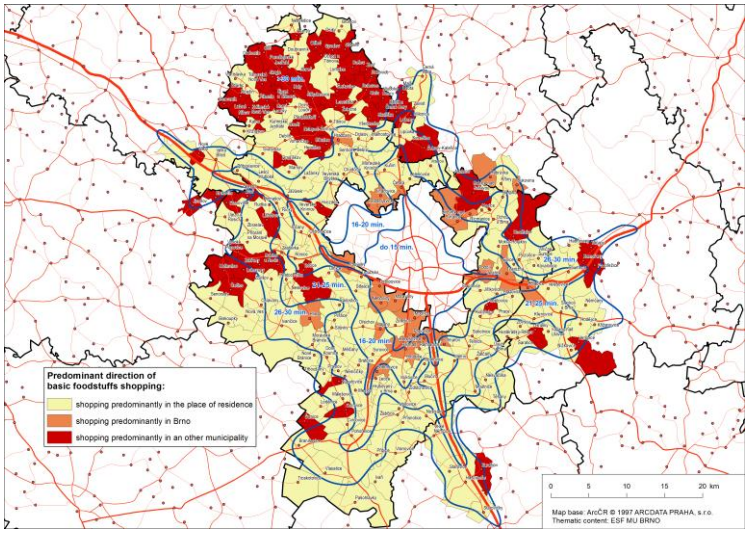


Fig. 1: Typology of the prevailing gravity for basic foodstuffs shopping.
Source: Our own survey

The simple typology in Figure 1 represents the prevailing direction (over 50%) of basic foodstuffs shopping. More then a half of the surveyed population (54%) shops for basic foodstuffs mostly in their place of residence, the remaining part shops in Brno and in an other municipality (23%) in equal parts. When segmenting according to the number of municipalities you can see the increased share of prevailing purchases in the place of residence (60% of municipalities) and in an other municipality (30%) while the share of the Brno center declines.

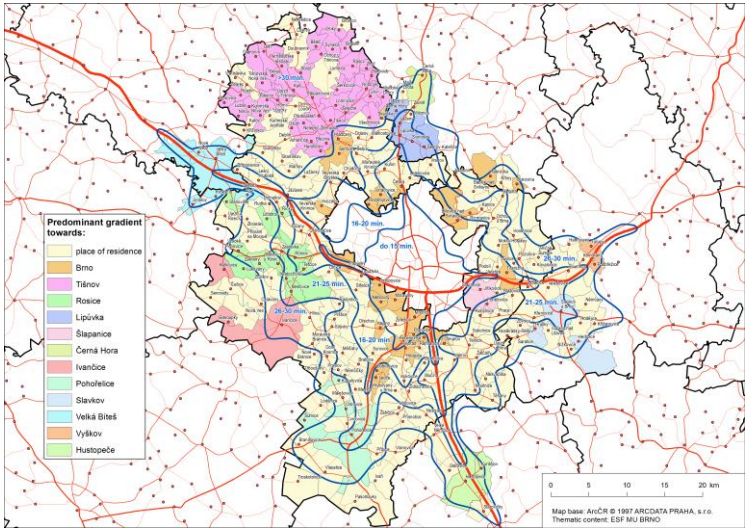


Fig. 2: Hinterlands of local centers for prevailing basic foodstuffs shopping gravity
Source: Our own survey

In case of purchases *predominantly in the place of residence* (type 1) these are mostly municipalities with larger populations in an area where the inhabitants perform their daily shopping for basic foodstuffs in their municipalities of residence due to their sound retail shopping facilities.

Shopping *predominantly in Brno* (type 2) is preferred by people from municipalities adjacent to Brno where it is easy to commute for shopping (public transportation, integrated transportation system) and most of the people also work in Brno. Type 3, i.e. shopping predominantly in an other municipality is a necessity for people from smaller municipalities with insufficient retailing infrastructure. Map No. 2 features the hinterlands of several local gravity centers; the peripherally located Tišnov area stands out most significantly among them since it is almost completely located beyond the 30-minute isochrone.

Data in Table No. 1 confirm the assumption that the number of people purchasing basic foodstuffs directly in their municipality grows with the size of the municipality while the number of people commuting for shopping into a larger municipality in the surroundings significantly declines. Inhabitants of various municipality size categories shop in Brno rather equally; about one quarter of shoppers commute to Brno, except for people from the smallest municipalities with less then 200 inhabitants.

Tab. 1: Shares of commuters for basic foodstuffs shopping from the three basic directions relative to the municipality size

Number of inhabitants	% of people shopping predominantly in the place of residence	% of people shopping predominantly in Brno	% of people shopping predominantly in an other municipality
less than 200	25 %	9 %	66 %
200–499	34 %	17 %	49 %
500–999	50 %	25 %	25 %
1000–1999	60 %	25 %	15 %
2000 and more	70 %	23 %	7 %

Source: Our own calculations

Table No. 2 illustrates the decline in willingness to shop for basic foodstuffs predominantly in Brno with the growing time distance from the city center. Except for the shortest time interval there prevails shopping for basic foodstuffs in the place of residence; with the growing distance from Brno the inhabitants of smaller municipalities make use of the easy daily commute to the nearby larger centers.

Tab. 2: Shares of commuters for basic foodstuffs shopping from the three basic directions relative to the distance from the center of Brno

Distance (min)	% of people shopping predominantly in the place of residence	% of people shopping predominantly in Brno	% of people shopping predominantly in an other municipality
up to 15	43 %	53 %	4 %
16–20	57 %	30 %	13 %
21–25	59 %	25 %	16 %
26–30	57 %	17 %	26 %
over 30	46 %	10 %	44 %

Source: Our own calculations

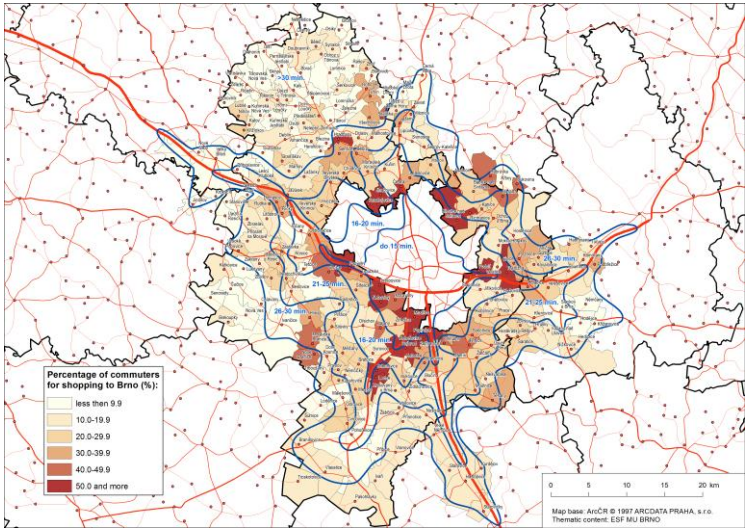


Fig. 3: Share of people commuting for basic foodstuffs shopping to Brno
Source: Our own survey

More then half of municipality inhabitants commute for basic foodstuffs shopping to Brno from only a few municipalities in the immediate hinterlands and this confirms the fact that this share declines with the time distance. This again depends on the transportation infrastructure quality, or rather, on the existence of higher-level roads.

CONCLUSION

The limited scope of this article makes it possible to introduce only some partial results of this large-scale research. Taking into account the range of the performed survey we consider some facts to be sufficiently representative for the wider area of the Brno agglomeration and generally valid also for similar model areas.

The size of the municipality doesn't determine the prevailing direction of shopping for basic foodstuffs towards central Brno but only towards a larger center in the vicinity of the particular municipality; the structure of settlement has an implicit influence on the daily shopping gravity in this context (small municipalities in the northern and large ones in the southern part of the agglomeration). The number of people shopping for basic foodstuffs directly in the municipality grows with the size of the municipality and at the same time

there significantly decreases the number of people commuting for shopping to any larger municipality in the surroundings; the size of the municipality has no decisive influence on the shopping intensity in Brno.

With the growing time distance from Brno the inhabitants of smaller municipalities make use of the easy daily commute to a nearby larger center for the basic foodstuffs shopping. The actual decisive factor for daily foodstuffs shopping is the distance in time or kilometers and the sufficient retail attractiveness of the particular center.

Acknowledgments: This article was prepared as a part of the GA AV ČR No. IAA301670901 project Spatial-temporal organization of daily urban systems: analysis and evaluation of selected processes. The authors hereby thank for this support.

REFERENCES

[1] MARYÁŠ, J. K metodám výběru středisek maloobchodu a sfér. In: *Zprávy GgÚ ČSAV*, 20, 3, 1983, s. 61-81.

[2] MARYÁŠ, J. Nadmístní střediska maloobchodu a služeb v ČSSR a jejich sféry vlivu. (Kandidátská disertační práce). Brno: Geografický ústav ČSAV, 1988, 134 s.

[3] MULÍČEK, O. Prostorové aspekty současného vývoje maloobchodní sítě. In: *Urbanismus a územní rozvoj*, X, 6/2007, 2007, s. 14-20.

[4] ORDELTOVÁ, M., SZCZYRBA, Z. Současná situace v maloobchodní síti českých měst – geografická sonda Zlín. In: *Urbanismus* a územní rozvoj, IX, 3/2006, 2006, s. 13-16.

[5] SCOTT, P. *Geography and Retailing*. 3rd edition, London: Hutchinson, 1973.

[6] SMAILES, A. E. Hierarchia miast v Anglii i Walii. In: Przeglad z zagranicznej literatury geograficznej, 2, 1967, 47 s.

[7] SPILKOVÁ, J. Nový fenomén: nákupní centrum a utváření nákupního chování spotřebitelů v transformačním období. In: *Geografie - Sborník České geografické společnosti*, 108, 4, 2003, s. 277-288.

[8] SZCZYRBA, Z. *Maloobchod v ČR po roce 1989 – vývoj a trendy se zaměřením na geografickou organizaci*. Olomouc : UP, 2005, 126 s.

[9] SZCZYRBA, Z. Transformace struktur maloobchodní sítě České republiky (regionálně geografická analýza s důrazem na Olomoucko). [Disertační práce]. Brno: Masarykova univerzita, 2000, 145 s.

[10] SZCZYRBA, Z. (2001): Funkční vztahy v maloobchodní vybavenosti města Olomouce. In: Acta Facultatis Studiorum Humanitatis Et Naturae Universitatis Prešoviensis, Folia Geographica 4, 35, Prešov, 2001, s. 205-213.

[11] SZCZYRBA, Z. Shopping gravity of large-scale stores – example of Terno Olomouc hypermarket (contribution to the study of the problematic). In: *Acta Universitatis Palackianae Olomucensis*, Geographica 37, Olomouc, 2002, 91-96.

[12] TONEV, P. Změny maloobchodní sítě v ČR v první polovině devadesátých let. [Diplomová práce]. Brno: Masarykova univerzita, 1998, 67 s.

Maloobchodní spád obyvatel v zázemí Brna

Dojížďka za službami a konkrétněji za maloobchodem představuje spolu s dojížďkou do zaměstnání a škol významný regiotvorný segment, jenž podílí se na formování funkčního městského systému. Předložený příspěvek představuje část rozsáhlého výzkumu, který proběhl v průběhu roku 2010. Modelové území bylo vymezeno obcemi okresu Brno-venkov, resp. 30 minutovou dojížďkovou vzdáleností individuální automobilovou dopravou v případě přesahu do jiných okresů. Cílem šetření bylo mj. zjistit spádovou profilaci obyvatel brněnské aglomerace v denních a nedenních nákupech, utváření sekundárních center dojížďky, oblibu nákupních center na okraji města a další aspekty.

VESELÍ NAD MORAVOU – PART OF THE UHERSKÉ HRADIŠTĚ OR OF THE HODONÍN DISTRICT?

Ondřej Šerý[1], Veronika Hubáčková[1], Ivana Šišperová[1], Jan Hercik[2], Václav Toušek[2]

[1] Department of Geography, Masaryk University

Kotlářská 2, 611 37 Brno

ondrej.sery@mail.muni.cz, v.hubackova@mail.muni.cz, 184539@mail.muni.cz

[2] Department of Geography, Palacký University in Olomouc

17. listopadu 12, 771 46 Olomouc

jan.hercik@upol.cz, vaclav.tousek@upol.cz

Abstract: *The town Veselí nad Moravou was a part of the Uherské Hradiště township from the beginning of historic townships in Moravia until the mid-19th century; later it became part of the political district of Uherské Hradiště. The administrative reform of*

1960, however, included the town and its hinterland in the Hodonín district in the South Moravia Region. The aim of this paper is to assess whether the traditional links of this town to Uherské Hradiště remain sustained at present or whether the citizens in Veselí nad Moravou and its hinterland rather consider the town of Hodonín to be for them a centre of higher order. The question was answered through the analysis of a questionnaire survey conducted in the concerned territory.

Key words: *Veselí nad Moravou, territorially administrative division, Uherské Hradiště, Hodonín, opinions of citizens*

INTRODUCTION

Patrimonial administration ceased to exist in 1848 when demesnes were replaced by the state administration (later also by self-government authorities) and several administrative reforms happened in the Czech territory of which some were rather insensitive. Many rural villages and even towns were included in administrative units (districts, regions) whose centres did not represent natural gravity centres for them. This was also the case of Veselí nad Moravou, which was included into the Hodonín district during the administrative reform in 1960.

VESELÍ NAD MORAVOU AND ITS ADMINISTRATIVE DISTRICT IN THE CONTEXT OF THE DEVELOPMENT OF TERRITORIAL ADMINISTRATION IN MORAVIA

At present, the town Veselí nad Moravou and its hinterland are part of the Hodonín district, which is situated in the South Moravia Region with regional authorities residing in Brno. In historic terms, however, for nearly four centuries the territory used to belong to the Uherské Hradiště township or political district.

A period important for the development of the administrative division of this territory is the period since the mid-16th century when administrative regions were established in Moravia. Before 1734, there were five regions, i.e. Brno, Olomouc, Jihlava, Znojmo and Uherské Hradiště. Later the Olomouc region split into two and the Přerov region came to existence. At that time, Veselí nad Moravou as well as all municipalities from its contemporary administrative district (defined as a district of the accredited municipal authority) were part of the Uherské Hradiště region (details see Horák J.V., 1965). The region of Uherské Hradiště reached in the south to the town Hodonín. The region included the area of Kyjov and a part of the Kroměříž area in the west, the area of Vsetín in the north and the area of Uherský Brod in the east. It also included the entire territory of the today's Zlín district. The town Hodonín was situated

already behind the borders of the Uherské Hradiště region and belonged in the administrative territory of the Brno region (Schenkl, K., 1845).

In 1850–1855, the number of regions in Moravia was reduced to two that were further divided into district offices. Political administration was separated from the judicial system and the political districts included smaller territories of judicial districts. The nearly entire original region of Uherské Hradiště was included in the Olomouc region with the only exception of Kyjov area, which was newly incorporated into the Brno region, not only as a judicial district but also as a political district. In that period, the town Veselí nad Moravou was part of the Uherské Hradiště political district and within it part of the Uherský Ostroh judicial district (Bartoš J. et al., 1966).

Further changes in the administrative division occurred in 1855 when Moravia was once again divided into six regions with seats in Brno, Olomouc, Znojmo, Jihlava, Nový Jičín and Uherské Hradiště. The judicial and political districts merged and 76 common district offices were established. At that time, the region of Uherské Hradiště included the territory of twelve districts, among others the districts of Hodonín and Uherský Ostroh a part of which Veselí nad Moravou was. The arrangement lasted until 1860 when the regional authorities were abolished. Nevertheless, the districts remained unchanged until 1868 in which year the political administration was separated from the judicial system again. The common district offices were replaced in Moravia by 30 district authorities with extended territorial scope whose administrative districts were divided into smaller judicial districts. At that time, the towns Uherské Hradiště and Hodonín represented the seats of district authorities (political districts). Veselí nad Moravou was situated within the territory of the Uherský Ostroh judicial district, which was part of the administration territory of the Uherské Hradiště political district (Bartoš J. et al., 1966).

Veselí nad Moravou was part of the Uherské Hradiště district until the beginning of 1949 – if we neglect the administrative arrangement during World War II. In the post-war period, a new system of regions was introduced. The region of Uherské Hradiště was replaced by the Gottwaldov region with the districts of Uherské Hradiště, Hodonín and a newly established district of Veselí nad Moravou.

Further significant changes in the territorially administrative division of the state occurred as late as 1960. New regions and new districts were created and their total number was considerably reduced as compared with the former system. There were only two regions in Moravia – North Moravia Region and South Moravia Region – within the framework of which 24 districts were established. Districts of Uherské Hradiště and Hodonín were included in the South Moravia Region. In this arrangement, the town Veselí nad Moravou and

its hinterland became for the first time a part of the Hodonín district. The northern part of the district of Veselí nad Moravou was included in the territory of the Uherské Hradiště district.

The last changes so far were based on the public administration reform in 2000, by which new administrative regions were established pursuant to Constitutional Act no. 347/1997 Coll. In Moravia, four administrative regions were established during the delimitation of which the districts of Uherské Hradiště and Hodonín were separated with the Uherské Hradiště district being incorporated in the Zlín Region and the Hodonín district in the South Moravia Region. District boundaries remained unchanged since 1960 and this is why the town Veselí nad Moravou continued in being part of the Hodonín district.

District authorities were abolished during the second phase of the public administration reform in 2002; however, the districts were preserved not only as statistical units but also as units of a part of the state administration – courts, police etc. As of 1 January 2003, administrative districts of municipalities with extended competences were established that were further subdivided into administrative districts of municipalities with the accredited municipal authority, which came to existence already in 1990. Veselí nad Moravou acquired the status of municipality with extended competences and hence at the same time the status of the municipality with the accredited municipal authority.

UHERSKÉ HRADIŠTĚ VS. HODONÍN IN THE OPINIONS OF CITIZENS LIVING IN VESELÍ NAD MORAVOU AND ITS HINTERLAND MUNICIPALITIES

Thus, the town Veselí nad Moravou and its nearest hinterland represented by the territory of the administrative district with the accredited municipal authority became part of the South Moravia Region. The traditional links to Uherské Hradiště situated in the Zlín Region have remained preserved. A questionnaire survey in May 2011 aimed at finding how strong the links are at the present. Respondents were 261 persons living in 11 municipalities of the administrative district with the accredited municipal authority (Veselí nad Moravou, Blatnice pod Svatým Antonínkem, Blatnička, Hroznová Lhota, Kněždub, Kozojídky, Moravský Písek, Suchov, Tasov, Vnorovy and Žeraviny). At the beginning of the year 2011, the population of the administrative district amounted to 23 502 persons (respondents' share 1.1%) while the population of Veselí nad Moravou was 11 628 persons (117 respondents – 1.0%) and the population of the remaining 10 municipalities in the district amounted to 11 874 persons (144 respondents – 1.2%).

The population size of Uherské Hradiště and Hodonín is approximately the same – over 25 thousand inhabitants. An analysis of transport accessibility from the centre of Veselí nad Moravou to the centres of the two towns showed that Uherské Hradiště is closer to Veselí by about 7 minutes by car. The distance to Uherské Hradiště is 16 km and can be done on average in 19 minutes while the distance to Hodonín is 27 km and the average drive by car takes 26 minutes. The number of direct train and bus connections is approximately the same. On working days, there are 38 and 36 connections from Veselí nad Moravou to Uherské Hradiště and Hodonín, respectively. Data from the 2001 census indicate that there were 228 and 123 persons commuting for work from Veselí nad Moravou to Uherské Hradiště and Hodonín, respectively. This situation is expected to last now because Uherské Hradiště is one of Moravian towns with the lowest unemployment rate and on the other hand, Hodonín is the town with a very high unemployment rate (16.9% at the end of 2010). A similarly stronger flow from Veselí nad Moravou to Uherské Hradiště (97 students) than to Hodonín (39 students) was detected in home-to-school travel. The offer of schools in Uherské Hradiště is still better than in Hodonín, this applying not only to secondary schools but also to higher education. In Uherské Hradiště, the higher education is provided by the Faculty of Logistics and Crisis Management of Tomáš Baťa University in Zlín, by the Department of Visual Arts, Faculty of Multimedia Communications of the same university, and by the detached workplace of the Faculty of Economics VSB – Technical University Ostrava. The only university workplace residing in Hodonín is a branch of the European Polytechnical Institute from Kunovice.

The first question of the questionnaire survey "Which of the two towns is more important as a centre for you" was answered that it was Uherské Hradiště by 152 persons (60.8% of unequivocal answers) and Hodonín by 98 persons; answers of 11 persons were equivocal. Uherské Hradiště was preferred by citizens of six municipalities (e.g. Veselí nad Moravou – 68.4%, of rural municipalities Suchov – 100.0%, Blatnička – 75.0%). In the municipality of Kozojídky, five citizens mentioned Uherské Hradiště and five citizens mentioned Hodonín. A greater part of citizens in the remaining four municipalities considered Hodonín as a centre of higher importance for them. The question to which of the two towns they go more frequently was replied by 146 persons (57.7%) mentioning Uherské Hradiště. Citizens from six municipalities preferred Uherské Hradiště and citizens from the remaining five municipalities preferred the town of Hodonín.

Very interesting answers were recorded from respondents asked to which of the two towns they go for selected services. The respondents did not have to mention any of the two towns in the case that the town of Veselí nad Moravou

itself provides those services for them. Results of the questionnaire survey are presented in Tab. 1.

Tab. 1: Place of the most frequently realized services for residents in the administrative district of the accredited municipal authority in Veselí nad Moravou (%)

Service	Uherské Hradiště	Hodonín	Veselí nad Moravou
Culture	55.6	18.4	26.0
Shopping	51.3	25.3	23.4
Secondary and high schools	38.7	26.4	34.9
Health service	36.0	23.0	41.0

Source: Questionnaire survey "Vazby obcí SO POÚ Veselí nad Moravou ke krajským a okresním městům", Masaryk University, Brno 2011.

The dominance of Uherské Hradiště in culture is not surprising because the town has a professional theatre scene (Slovácké divadlo Theatre), a well-attended festival of Summer Film School and an open-air cinema. On the other hand, the fact that more than a half of the respondents mentioned Uherské Hradiště as a more important shopping centre for them is a bit surprising because Hodonín has a higher number of hypermarkets and shopping malls (2 Kauflands, Albert and OBI) than Uherské Hradiště (Kaufland and Tesco). At that, Uherské Hradiště does not have any of such an extensive shopping centre as the Cukrovar shopping mall in Hodonín. This indicates that the preference is given to Uherské Hradiště for its shorter distance from Veselí nad Moravou.

Smaller variances were observed between the two towns in the attendance of secondary and high schools. The portfolio of secondary schools is somewhat broader in Uherské Hradiště (even a secondary medical school) and the town dominates as to high schools (see above). About two fifths of respondents were content with health service facilities located in Veselí nad Moravou. In spite of the fact that the local hospital was closed down, a health centre on the premises continues to provide extensive services. Nevertheless, the main health centre for the Hodonín district is represented by the hospital in Kyjov. If this possibility were offered to the respondents, the town Kyjov would have probably outranked both Uherské Hradiště and Hodonín as to the number of positive answers.

Another question was to find out whether the respondents read the regional newspapers and which of them. As to dailies, a greater part of respondents (62 persons) mentioned the daily of Slovácký deník, which is meant for citizens in the district of Uherské Hradiště. The Hodonínský deník Daily was mentioned only by 14 persons. However, in terms of weeklies, the paper Nové Slovácko with the editors' office in Hodonín (44 answers) was more important for the

respondents than Dobrý den s kurýrem with the editors' office in Uherské Hradiště (only 7 answers).

Although the above answers indicated a closer link of Veselí nad Moravou to Uherské Hradiště, the question of whether the area should belong in the district of Uherské Hradiště or in the district of Hodonín was answered positively by 112 and 142 respondents, respectively, with the remaining seven respondents not having provided an equivocal opinion. The fact is likely to be caused by the fifty years' affiliation of the area in the Hodonín district. The district of Uherské Hradiště was quoted only by a majority of respondents from the town Veselí nad Moravou and from the municipalities Blatnice pod Svatým Antonínkem, Blatnička and Suchov.

CONCLUSION

The questionnaire survey included a drawing of mental maps in which the respondents were asked to demarcate the micro-region of Veselí nad Moravou. More than 200 respondents mentioned that the area of Veselí nad Moravou includes in addition to the town itself the municipalities of Vnorovy, Kozojídky, Hroznová Lhota, Žeraviny and Tasov. These municipalities accounted in 2001 for more than a quarter of all economically active persons commuting to Veselí nad Moravou. In addition to Blatnice, Kněždub and Blatnička, the group of municipalities with the frequency of 101-200 responses also included Lipov, Louka (Velká nad Veličkou administrative district with the accredited municipal authority) and Uherský Ostroh, which constitutes by itself a municipality with the accredited municipal authority in the district of Uherské Hradiště. Of municipalities that belong in the administrative district with the accredited municipal authority in Veselí nad Moravou, the lowest number of respondents (75) mentioned Moravský Písek in the micro-region, which has closer links to Bzenec, and Suchov (44) whose affiliation to Veselí nad Moravou is indisputable but which has an eccentric location with respect to other municipalities in the micro-region. The questionnaire survey confirmed that municipalities situated in the northern part of the Veselí nad Moravou administrative district with the accredited municipal authority have more frequent links with Uherské Hradiště than with their district town Hodonín.

Acknowledgement: The paper was prepared within the framework of projects "Manifestations of global environmental change in the Earth's landscape sphere" (MUNI/A/0966/2009), which is funded by the Masaryk University and "Landscape as a geosystem: changes in temporal and spatial structure and their main mechanism" (PrF_2011_006), which is funded by the Palacký University in Olomouc.

REFERENCES

[1] BARTOŠ, J. a kol. Historický místopis Moravy a Slezska v letech 1848 – 1960 (*Historic topography of Moravia and Silesia in 1848 – 1960*). Vol. I., Územně správní vývoj státních a společenských institucí a organizací na Moravě a ve Slezsku v letech 1848 – 1960 (*Territorially administrative development of government and social institutions and organizations in Moravia and Silesia in 1848-1960*). Ostrava: Profil, 1966. 335 pp.

[2] BARTOŠ, J., SCHULZ, J., TRAPL, M. Historický místopis Moravy a Slezska v letech 1848 – 1960 (*Historic topography of Moravia and Silesia in 1848 – 1960*). Vol. VIII., Okresy: Uherské Hradiště, Uherský Brod, Hodonín, Kyjov (*Districts: Uherské Hradiště, Uherský Brod, Hodonín, Kyjov*). Ostrava: Profil, 1982. 355 pp.

[3] HORÁK, J. V. Vývoj územní organizace (*Development of territorial organization*). In: Atlas Československé socialistické republiky. Praha: ČSAV and ÚSGK, 1965.

[4] SCHENKL, K. Hradišťský kraj (Der Hradischer Kreis). In: Mapy moravských a slezských krajů z let 1841 - 1845. [on-line] (*Maps of Moravian and Silesian regions from 1841-1845*). Praha: Výzkumný ústav geodetický, topografický a kartografický, 2011. Available on WWW <http://mapy.vugtk.cz/schenkl/index.php?rs=1>. [cit. 13 Aug. 2011].

Veselí nad Moravou – součást Uherskohradišťska či Hodonínska?

Článek prezentuje výsledky dotazníkového šetření, které bylo věnováno studiu vazeb obcí mikroregionu Veselí nad Moravou s okresními městy Uherské Hradiště a Hodonín. Šetření potvrdilo poměrně silnou tradiční vazbu občanů dotčeného regionu na Uherské Hradiště, ač je Veselsko součástí okresu Hodonín již od roku 1960.

SUSTAINABLE DEVELOPMENT OF RURAL AREAS IN THE HINTERLAND OF ZLÍN

Antonín Věžník, Jakub Trojan

Department of Geography, Faculty of Science, Masaryk University

Kotlářská 2, 611 37 Brno

veznik@sci.muni.cz, trojan@geogr.muni.cz

Abstract: *Paper discusses possibilities of sustainable regional development in rural hinterland of Zlín. Delimitation of rural metropolitan hinterland is difficult topic and we*

use the functional microregional delimitation of Zlín's hinterland in this paper instead of traditional administrative delimitation. paper also includes results of questionnaires and interviews done with involved subjects – municipalities and inhabitants. Practical purposes could be seen in particular suggestions to strategic documents and concepts.

Key words: *sustainability, regional development, microregions, rural development, Zlín*

INTRODUCTION

Sustainable development of rural areas is very problematic issue that has not clearly defined outputs (Woods, 2005). However, it is clear that it affects the rural way of life, settlements, countryside and actors involved in rural areas (Hill, 2003). It is also necessary to effectively plan the strategic development of the territory with respect to its limits and potential in the context of European regional policy (Wokoun, 2009). Therefore, applications dealing with sustainable development in microregional context (eg. Spišiak, 2002 or Věžník, 2007) often link to bottom-up principle, which means activation of regional potential. The key position is the role of external facilitator in this potential but we should also respect the perspective of local actors in development and mutual cooperation at local level (Perlín, 2006). These methodological facts have been the bases for the implementation of research for sustainable rural development in the hinterland of Zlín.

AREA DELIMITATION

The area in which the research was conducted for the purpose of shaping the sustainability of rural countryside was the hinterland of Zlín. This hinterland has been earmarked as a functional microregion of Zlín (methodically following Hampl, 1996, 2005) – see Fig. 1. There are 92 municipalities; the research was carried out in selected locations across the model defined microregion (Trojan, 2009).

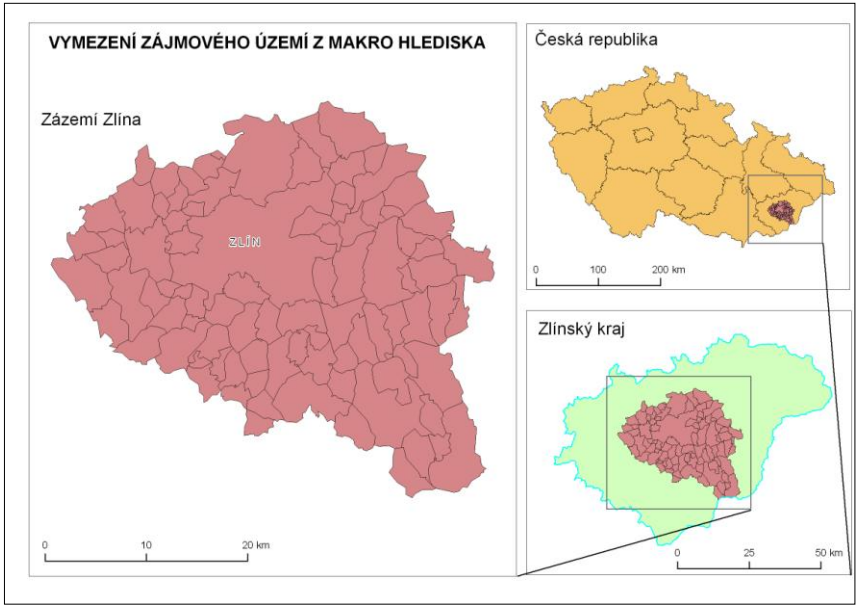


Fig. 1: Delimitation of functional Zlín's area (source: J. Trojan, 2009)

METHODS

The qualitative survey was realized with extensive field research which was based on a questionnaire survey and interview procedures. Target group (respondents) were actors, public administration (municipal officials), and the inhabitants of two model sites, which were selected as model communities - Žlutava and Pozděchov (see Fig 2 – brown villages are model communities, blue villages are municipalities selected for interviews; red towns in agglomeration is the core of microregion).

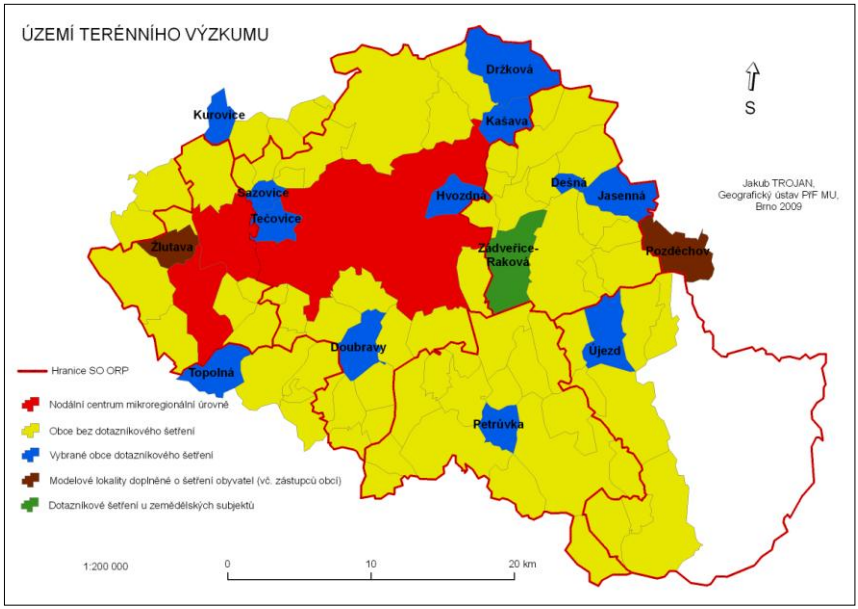


Fig. 2: Locations selected for research, based on terrain reconnaissance (source: J. Trojan, 2009)

RESULTS

The results of qualitative research done in model localities are structured according to the type of respondents who were surveyed. Interpretation of data is part of further reading.

MUNICIPALITIES

Interviewed municipalities see the direction of their development mostly in residential construction and investment in infrastructure. Relatively underrated is (sustainable) tourism, which could bring the external capital (through the tourists). Tourism is also one of the activities supported by grants from Regional Operational Programme (ROP) Central Moravia.

The survey showed that we cannot accurately determine the level of activation of the population, however, more active communities are mostly in the western part of microregion, residents are more passive min the marginal east. This fact cannot be regarded as authoritative, because responses were subjectively influenced by the role / attitude (and knowledge) of interviewed persons

(usually the mayor). Mayors also very criticize the lower level of activity of people. Other outputs are as follows:

- The community development activities are usually held by engaged mayor, and his role is usually the executive (eg municipal council is serving project proposals, preparation and implementation of the project is after that in diction of mayor). Outsourcing is being chosen mostly while dealing with municipal maintenance and repairing / maintenance of municipal property.
- Between 2003–2007 municipalities gained (except the smallest village Dešná) relatively large number of grant applications with relatively high success rate. These subsidies, however, generally had a capital nature and were provided from the regional (district) or national (so-called "ministerial") sources. Municipalities avoid complex mechanisms of the EU grants and applying for a grant from European funds.
- Almost all municipalities have a zoning plan, but only half of the municipalities have strategy of development or other kind of development document. There are dominating misconception in municipalities which identifies development strategy as the same as municipal policy statement. The absence of strategy development can be a serious obstacle to a systematic and targeted regional development under financing mechanisms of the EU grant schemes.
- Cooperation among municipalities themselves is formally active, but the existence of a large number of ad-hoc microregions with limited functionality disproves these claims. The frequency of voluntary associations also causes considerable overlaps and there are cases where one village is member of four voluntary associations of municipalities. Present system is not optimally adjusted but despite this fact, local action groups are quite active in the area of interest.

INHABITANTS OF SELECTED MUNICIPALITIES (ŽLUTAVA AND POZDĚCHOV)

Model localities were deliberately chosen for their difference in spatial position in the hinterland of Zlin. The zero hypothesis (working set before the research) predicted a high influence on the life of Zlín agglomeration in the neighbouring village Žlutava as municipality near the conurbation and unaffected people living in marginal (but compact) Pozděchov village in the eastern part of the Vizovická Highlands. The survey findings refute the zero hypotheses, which attributes to Žlutava disproportionately higher cohesion and interaction of

population than in peripheral Pozděchov. The identity of Pozděchov residents to the village despite the prejudices of the strength and unity of the Wallachian culture recedes from the impact of unfavourable socio-economic conditions. The negative effects of external conditions are reflected in the so-called hard data - according to data of the Czech Statistical Office has Pozděchov population decline (while in 2001 the Census 2001 showed 586 residents, according to the words of the mayor in 2009 there are only 555 people). Rising unemployment rate (as another manifestation of the impact) is amplified by the consequences of global economic crisis. Impacts can be further deepened and frustrations of the population can lead to another wave of migration into larger settlements.

Unutilized potential in Pozděchov is sustainable tourism. In most villages could be problems with tourists (where the locals do not want mass tourism) but residents in Pozděchov would welcome an increase of tourism (which is evident from responses to questionnaires and interviews). Targeted and systematic promotion of tourism would make it possible to bring more tourists to the area, would lead to strengthening the business environment (for restaurant and accommodation facilities - which in turn, through multiplier effects, could enhance the market environment in other sectors) and in particular could help to return traditions to the village and thereby enhance the interest of their own community.

According to the results, residents of Žlutava municipality are only slightly affected by the aspects of surrounding Zlín agglomeration. The explanation could be both strong traditions and regulation of new construction by the municipality (village according to the current zoning plan has no longer the land for housing and according to the words of the mayor council does not want to actively create) and also not yet fully developed process of desurbanization in Zlín. Negative impacts for residents may have growth of industrial zones in Napajedla and Otrokovice (which will involve the surrounding land originally belong to cadastres of neighbouring villages), thereby worsening the environment, which is already criticized by some residents. Related to growing transport, residents also feel the lack of parking spaces for tourists arriving on trips to Chřiby (for which is Žlutava the tourist gateway), and although the inhabitants do not mind tourism in the village (which is even more amplified with many traditional parades, festivals and events), increased burden and lack of car parking would be a problem.

DISCUSSION AND CONCLUSION

The greater Zlín area as a compact microregion could be seen in two ways. Clearly preferential municipalities are located closer to Zlín agglomeration and they lie on important transport routes. Municipalities of the Eastern part (the eastern periphery) are often deprived by unfavourable economic situation and the frustration of the population of the ongoing economic crisis. This results in low activity of the population in these parts of the region, accompanied by waves of migration towards the larger settlements. Although Eastern Wallachia predicts strong folk tradition, our research shows the declining practice in everyday community life, which may pose a threat to loss of identity of the population (model locality of Pozděchov). By contrast, in villages near Zlín agglomeration (model locality of Žlutava) people keep the strength of civil society tradition (but cannot be considered as a rule). Processes of desurbanization that can be expected in the metropolitan areas show only a limited extent in the rural hinterland of Zlín and are statistically detectable as a positive migration balance of rural settlements and a negative migration balance of urban settlements.

Our research also indicates inefficient use of the potential of the area (especially in the tourism industry - both infrastructure and promotion) and the systematic use of development instruments in the form of voluntary associations of municipalities. Bundles are often purposefully set up and only half of the municipalities have drawn up a policy document of strategic development (typically a policy or program). Municipalities are also used to apply for funding from the European Union and are aimed only at the regional or national sources. The lacks of policy documents in many cases do not allow municipalities to successfully apply for funding of their projects from EU grant schemes.

REFERENCES

[1] HAMPL, M. et al. (1996): Geografická organizace společnosti a transformační procesy v České republice. Univerzita Karlova v Praze, Přírodovědecká fakulta. Praha: 1996. 395 s. ISBN 80-90215-42-4

[2] HAMPL, M. (2005): Geografická organizace společnosti v České republice: Transformační procesy a jejich obecný kontext. Univerzita Karlova v Praze, Přírodovědecká fakulta. Praha: 2005. 148 s. ISBN 80-86746-02-X

[3] HILL, M. (2003): Rural settlement and the urban impact on the countryside. London : Hodder & Stoughton, 2003, 156 p. ISBN 0-340-80028-3

[4] PERLÍN, R. (2006): The co-operation of rural municipalities - chance or condition of achievement. In: Agriculture economy. Praha: Česká akademie zemědělských

věd - Ústav zemědělských a potravinářských informací, vol. 52/6, 2006. s. 263 – 272. ISSN 0139-570X

[5] SPIŠIAK, P. a kol. (2002): Trvalo udržatelný rozvoj mikroregiónu Ptava. Humenné : Visual studio, 2002, 38 s. OÚ – OOA / 2002 33094

[6] TROJAN, J. (2009): Trvale udržitelný rozvoj venkova v zázemí města Zlína. Diplomová práce - rukopis. Geografický ústav Přírodovědecké fakulty Masarykovy univerzity v Brně, 2009. 92 s. (+ přílohy). Vedoucí práce: doc. RNDr. Antonín Věžník, CSc.

[7] VĚŽNÍK, A. (2007): Možnosti rozvoje venkovského mikroregionu (na příkladu Jemnicka a Vranovska). In Česká geografie v Evropském prostoru. České Budějovice: Jihočeská univerzita v Českých Budějovicích, 2007.s. 774-779. ISBN 978-80-7040-986-

[8] WOKOUN, R. a kol. (2008): Regionální rozvoj: východiska regionálního rozvoje, regionální politika, teorie, strategie a programování. Praha: Linde, 2008. 475 s. ISBN 9788072016990

[9] WOODS, M. (2005): Rural geography: processes, respones and experiences in rural restructuring. London: Sage Publications, 2005. xiv, 330 p. ISBN 0-761-94761-2

Trvale udržitelný rozvoj venkova v zázemí města Zlína

Článek diskutuje možnosti trvale udržitelného rozvoje venkovské oblasti v zázemí Zlína. Samotné vymezení venkovského zázemí metropolitní oblasti je delimitováno ve smyslu funkčního mikroregionálního zázemí Zlína (nikoliv administrativně). Analýza je zaměřena na vyhodnocení dotazníkového šetření a a řízených interview u zainteresovaných subjektů – představitelů obcí a obyvatel modelových lokalit, kterými jsou obce Žlutava a Pozděchov. Tyto lokality vykazují odlišnou percepci obyvatel týkající se rozvoje regionu. Zatímco Pozděchov (ačkoliv s předpoklady pro folklórní tradice) trpí deprivací ekonomické recese a frustrací obyvatel, která se projevuje i na jejich participaci ve veřejném životě obce, tak Žlutava (ačkoliv v zázemí metropolitního areálu) vykazuje pospolitost místních občanů s relativně kohezními názory na zachování stávajícího směru rozvoje. Výzkum však ukázal rezervy ve využívání potenciálu regionu a především chybné (nebo nedostatečné) využívání nástrojů regionální politiky při rozvoji mikroregionu za využití strukturálních fondů Evropské unie.

MOTIVATIONAL FACTORS OF MIGRATION FLOWS AND THEIR IMPACT ON RESIDENTIAL IDENTITY OF RESIDENTS IN SUBURBAN ZONE OF THE NITRA CITY IN 1998–2006

Gabriela Repaská, Alena Dubcová

Department of Geography and Regional Development FNS CPU

Trieda A. Hlinku 1, 949 74 Nitra

grepaska@ukf.sk, adubcova@ukf.sk

Abstract: *The paper offers information on the causes and reasons of migration of residents from the Nitra City to rural villages of its suburban zone. The arrival of new residents to countryside with the urban way of life, urban lifestyle, and urban behavior influences and interferes in the life of original residents of countryside and interferes also the countryside itself. The construction of new family houses changes the traditional look of the countryside. The lack of interest of new residents in public events in the village as well as in the residents themselves changes the behavior of the original residents which disturbs also the relationship of the resident to the village.*

Key words: *suburbanization, migration, migration factors*

INTRODUCTION

The process of suburbanization significantly influences the residential structure of cities. Since 1989, it has reached the post-socialist cities and markedly influences also the cities of Slovakia (Bratislava and Košice). After the year 2000, this process began to show also in large cities of Slovakia and it has been forming also on the example of the Nitra City.

The process of suburbanization has major environmental, economic and social consequences. It influences the relationship of a man to the village and it also leads to the revitalization of countryside mainly by new residents. It causes the decrease of residential identity of the local residents by breaking the natural social structure of society, traditional forms of settlement, architectonic object structure, etc. The decrease of social, cultural and environmental awareness can lead to gradual internal isolation and passivity of residents which is reflected also in their inappropriate behavior in the country.

METHODS AND AIM OF THE PAPER

The aim of the paper is to point out the motivational factors of the inhabitants' migration from the Nitra City to suburban villages.

Suburban villages of the Nitra City were defined based on the methodical approach which was used in the paper of Czaková (2010). It is based on the suburbanization indicators which are:

- decrease of the number of inhabitants in cities and towns and increase of the number of inhabitants in rural villages,
- migration decrease in cities or towns and migration increase in rural villages,
- proportion of immigrants from the Nitra City to rural village from the total number of immigrants of that village when this proportion of immigrants had to reach higher values as the proportion of immigrants from other directions.

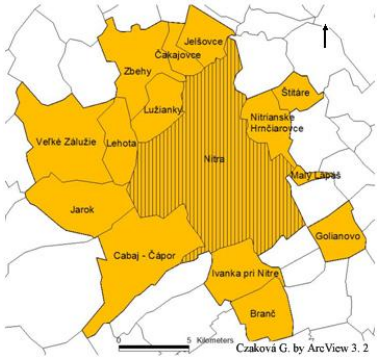
Motivational factors of migration flows from the Nitra City to suburban villages were evaluated from two viewpoints.

The first viewpoint was based on the so-called "hard" data which were provided by the Statistical Office of the Slovak Republic and migrants provided them in the so-called Reports on Migration.

The second viewpoint was based on the so-called "soft" data which were obtained by the questionnaires.

SUBURBAN ZONE OF THE NITRA CITY IN 1998–2006

The development of suburbanization processes was monitored during the years 1998–2006. Based on the mentioned methods, the suburban villages of the Nitra City are totally 14 villages: Branč, Cabaj – Čápor, Čakajovce, Golianovo, Ivanka pri Nitre, Jarok, Jelšovce, Lehota, Lužianky, Malý Lapáš, Nitrianske Hrnčiarovce, Štitáre, Veľké Zálužie, Zbehy. Suburban villages are localized in the close accessibility to the city or they share the same administrative boundaries. In the surroundings of the city, they form continuous suburban zone (Map 1).



Map 1: Suburban Zone of the Nitra City in 1998–2006

Suburban zone of the Nitra City covers the area of 207.7 km^2 and it has 27 492 residents. Density of the zone is 132.4 residents per square kilometer. The villages of Malý Lapáš, Jelšovce and Štitáre are according to the size categories of villages and number of inhabitants, small villages. The other villages of the suburban zone are large villages (2 000–4 999 residents).

MIGRATION OF INHABITANTS FROM THE NITRA CITY TO VILLAGES OF THE SUBURBAN ZONE

The Nitra City is the only city in the Nitra Region. The processes of suburbanization in the city are relatively intensive. The localization of the city has undermined the development of the central functions of the city (cultural, educational, service, etc.) which are strengthened also nowadays. Regarding the landscape structure, we notice the loss of area of agricultural land and increase of commercial areas which is connected to the increase of motor and public transportation in the city. As for the economic structure, we can observe high price of land parcels, apartments and family houses in the city and based on this fact, middle classes of society move to cheaper rural environment. Motivation of moving to countryside has, however, more environmental basis because they desire to live in cleaner environment and have higher quality of life in the countryside. The change of migration flows from the city to countryside was influenced mainly by cheaper values of properties in the background of the city.

The total number of immigrants from the towns of the Nitra Region to the rural villages of the Nitra Region during 1998–2006 was 2 864 inhabitants. Emigration from the Nitra City was the most intense among the all towns of the Nitra Region. It was shown on the number of immigrants from the city to rural

villages from the total number of immigrants of rural villages (757; 26.4 %). Immigrants from the city moved to 123 rural villages. The highest proportion (38.3 %) of the Nitra residents from the total number of immigrants of the village was in the middle-sized rural villages from 1 000 to 1 999 inhabitants (Tab. 1).

Tab. 1: Immigration of Residents to Rural Villages of the Nitra Region from the Nitra City in 1998–2006

Total number of immigrants to rural villages from the towns of the Nitra region	from the Nitra City		Number of villages with immigrants from the Nitra City	Number of immigrants to rural villages from the Nitra City according to size categories									
				Small		Middle-sized				Large			
				do 499		500-999		1000-1999		2000-4999		5000-9999	
	abs	%		abs	%	abs	%	abs	%	abs	%	abs	%
2864	757	26,4	123	98	12,9	113	14,9	290	38,3	256	33,8	0	0,0

Source: Statistical Office of the Slovak Repbulic, 2011, Repaská, 2011 – own calculations

OBJECTIVE PERCEPTION OF THE MOTIVATIONAL FACTORS OF MIGRATIONS FLOWS OF INHABITANTS TO SUBURBAN VILLAGES OF THE NITRA CITY

The research on migration tendencies includes the analysis of causes and preferences of the urban residents moving to suburban villages of the Nitra City. As we mentioned in the methods of the paper, particular reasons of moving are based on the statistical categories of the Statistical Office of the Slovak Republic and migrants provide them in the so-called "Report on Migration". This report mentions the reasons of moving and the migrant can choose only one main reason from the following:

1. change of workplace
2. closer distance to workplace
3. study
4. health reasons
5. marriage
6. divorce
7. housing reasons
8. following a family member
9. other

In the suburban zone of the Nitra City, the housing conditions dominate from the mentioned reasons (59.9 %). 36.7 % of residents, from the total number of 362, stated the following a family member as the reason for moving to the countryside and 9.4 % of residents chose the category of other reasons. None of the residents moved to the village during 1998–2006 because of working conditions or coming closer to workplace or study. Only two residents moved to the village because of health reasons and three residents (0.9 %) because of divorce. The marriage was mentioned by 6.0 % residents (Tab. 1).

Tab. 1: Reasons of Residents' Moving from the Nitra City to Suburban Villages in 1998–2006

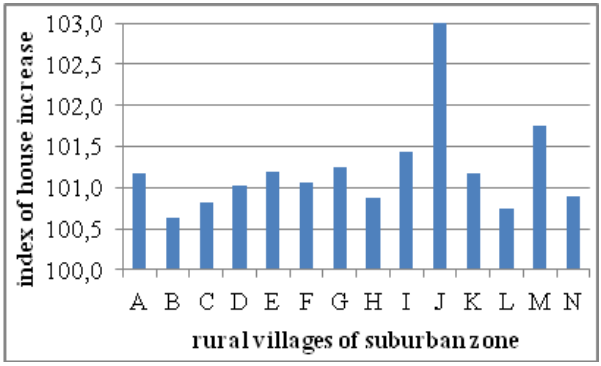
reasons / villages	change of workplace		coming closer to workplace		study		health reasons		marriage		divorce		housing reasons		following family members		other reasons		sum	
	abs	%	abs	%	abs	%	abs	%	abs	%	abs	%	abs	%	abs	%	abs	%	abs	%
Branč	0	0	0	0	0	0	0	0	1	5	0	0	14	70	5	25	0	0	20	100
Cabaj - Čápor	0	0	0	0	0	0	1	2,1	2	4,3	0	0	24	51,1	12	25,5	8	17	47	100
Čakajovce	0	0	0	0	0	0	0	0	2	13,3	0	0	7	46,7	4	26,7	2	13,3	15	100
Golianovo	0	0	0	0	0	0	0	0	1	5,6	0	0	9	50	6	33,3	2	11,1	18	100
Ivanka pri Nitre	0	0	0	0	0	0	1	2,3	2	4,7	0	0	25	58,1	15	34,9	0	0	43	100
Jarok	0	0	0	0	0	0	0	0	2	8	0	0	17	68	6	24	0	0	25	100
Jelšovce	0	0	0	0	0	0	0	0	1	10	0	0	5	50	3	30	1	10	10	100
Lehota	0	0	0	0	0	0	0	0	0	0	0	0	9	60	5	33,3	1	6,7	15	100
Lužianky	0	0	0	0	0	0	0	0	3	6,1	1	2,0	17	34,7	22	44,9	6	12,2	49	100
Malý Lapáš	0	0	0	0	0	0	0	0	0	0	0	0	5	71,4	2	28,6	0	0	7	100
Nitrianske Hrnčiarovc	0	0	0	0	0	0	0	0	2	5,1	0	0	22	56,4	12	30,8	3	7,7	39	100
Štitáre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	50	4	50	8	100
Veľké Zálužie	0	0	0	0	0	0	0	0	2	5,4	2	5,4	20	54,1	11	29,7	2	5,4	37	100
Zbehy	0	0	0	0	0	0	0	0	1	3,4	0	0	17	58,6	10	34,5	1	3,4	29	100
sum	0	0	0	0	0	0	2	0,6	19	5,2	3	0,8	191	52,8	117	32,3	30	8,3	362	100

Source: Statistical Office of the Slovak Republic, 2011; Repaská, 2011 – own calculations

Housing reasons dominate almost in all villages of suburban zone of the Nita City.

In the village of Lužianky, the residents preferred the reason of following the family member (44.9 %) and housing reasons were stated in this village by 34.7 % residents. The reason of moving to the village of Štitáre was following the family member and other reasons. Housing reasons were not interesting for the residents during the monitored period. The strong revitalization has taken place in the village and since 2009, also the construction of family houses on the private land. These family houses were during 1998–2006 only in construction.

The increase of houses in countryside is documented by the index of house increase. The values of this index, during the period of 1998 - 2006 in the all villages of suburban zone, range over 100 which mean that during this period the expansion of housing development took place. The highest index of increase was in the village of Malý Lapáš (103.0), the lowest index of increase was (100.6) was in the village of Cabaj - Čápor (Fig. 1).



A – Branč,
B – Cabaj – Čápor,
C – Čakajovce,
D – Golianovo,
E – Ivanka pri Nitre,
F – Jarok,
G – Jelšovce,
H – Lehota,
I – Lužianky,
J – Malý Lapáš,
K – Nitrianske Hrnčiarovce,
L – Štitáre,
M – Veľké Zálužie,
N – average

Fig. 1: Index of House Increase in the Villages of Suburban Zone of the Nitra City in 1998–2006
Source: Statistical Office of the Slovak Republic, 2011; Repaská, 2011 – own calculations, Repaská, 2011– own calculations

The increase of living standard by construction of new apartment or house increases the living standard of residents. Individual housing development, construction of family houses, construction of rental apartments or construction of complete houses in cheaper and cleaner environment in countryside indicates the movement of residents from the city or town.

The most frequent form of new housing in the villages of suburban zone is *revitalization* – reconstruction of old house stock. This form of construction was realized in each village of the suburban zone. In the villages of Čakajovce,

Štitáre, Ivanka pri Nitre and Veľké Zálužie during the monitored period, it was the only form of construction mainly from the reason of absence of municipal land parcels. The village of Ivanka pri Nitre has tried for the last 5 years about the strong re-emigration of residents (return of former residents back to the village) by the reconstruction of old houses and revitalization of existing house stock. The price of land parcels ranges in these villages from 15 € (village of Čakajovce) to 50 € (village of Štitáre) – Tab. 2.

Picture 1: Individual Construction of Family Houses in the Village of Golianovo
Photo: Repaská, 2011

Except the already mentioned villages, there are also other forms of new housing in the rest of the villages of suburban zone and the most common form is the *construction of family houses*. The construction is carried out by the customers or they use construction firm which realizes the complete construction. In the villages, the standard catalogue houses dominate. The characteristic localization of the construction of family house is to the centre of usually smaller parcel. This form of construction is ongoing in the villages of Nitrianske Hrnčiarovce, Branč, Jelšovce, Lehota, Malý Lapáš, Cabaj – Čápor, Lužianky, Golianovo and Zbehy (Picture 1). The price of these parcels in these villages ranges from 33 € (Cabaj - Čápor) to 100 € (Nitrianske Hrnčiarovce), and their size is 6-10 ares (Tab. 2).

The next possibility of realization of new constructions is the form of *developer projects*. Developers buy land parcels in rural villages, construct the infrastructure, divide the area to more parcels and sell it. These forms of family houses are for firms very profitable because their construction in terms of land use plan is not a problem to enforce and their connection to engineering networks is technically and financially less difficult. In the villages of suburban zone, this form of construction have not been realized so far, however, it is planned in the local part of Cabaj - Čápor in the locality of Nový Cabaj (Picture 2 and Tab. 2).

Picture 2: Planned Construction Using Developer Projects in the Locality of Nový Cabaj
Photo:http://reality.mojanitra.sk/reality-lokalita-novy-cabaj-23ha-urcenych-pre-vystavbu/nitra.html?id_temy=805&action=clanky&id_clanku=25666&p_sekcia=

The construction of *new housing units* participates also in the process of suburbanization. It is necessary to pay attention to the fact that from the aspect of suburbanization, we have to exclude the construction of social apartments from this form of construction because they serve to the residents of the village. From the viewpoint of construction, the interesting are housing units for the residents from the city or town. The municipality usually participates on this construction and new apartments are offered to rent. An example can be the housing unit built in the village of Jarok which, however, has not already been built during the monitored period (Picture 3).

In the village of Branč, this form of construction is being also realized and it is planned to build 12 two-house units, but there are only three built and so far empty. The village has two housing units which are resided by the local residents. In the village of Nitrianske Hrnčiarovce, the construction of complete housing units with underground parking lots with the area of 1 ha is planned. There will be three two-house units, two three-house units and one four-house unit (Tab. 2).

Picture 3: Construction of New Housing Units in the Village of Jarok
Photo: Repaská, 2011

Picture 4: Construction of Two-house Units in the Village of Branč
Photo: Repaská, 2011

The *construction of rental apartments* can be also included in the process of suburbanization. However, in the villages of suburban zone, there are no rental apartments with the immigrated residents from the towns. There are only the rental apartments resided by the local residents in the villages. Therefore, this type of construction was not included in the suburbanization processes.

Tab. 2: Forms of New Housing in the Villages of Suburban Zone of the Nitra City

villages	type of construction	number of family houses in the areal of construction			number of housing units			price of parcel for 1 m^2 (€)	size of parcel (ares)
		planned	built	resided	planned	Built	resided		
Branč	A, B,D	32	32	26	12	3	0	33	6 - 8 ares
Cabaj Čápor*	A,B/C*	36/104*	27/0*	15/0*	0	0	0	25/50*	6 - 10 ares
Golianovo	A, B	72	8	6	0	0	0	25	6 - 10 ares
Jarok	A, B, D	23	2	0	2	1	0	25-33	6 - 8 ares
Jelšovce	A, B	24	24	14	0	0	0	7	8 ares
Lehota	A, B	74	5	5	0	0	0	50 - 66	6 - 8 ares
Lužianky	A,B	60	30	30	0	0	0	33	6 - 8 ares
Malý Lapáš	A,B	275	100	50	0	0	0	25	6 - 8 ares
Nitrianske Hrnčiarovce	A, B	72	45	27	6	0	0	70	6 - 8 ares
Zbehy	A, B	10	10	6	0	0	0	30 - 33	6 - 8 ares
Štitáre	B	0	0	0	0	0	0	50	0
Ivanka pri Nitre	B	0	0	0	0	0	0	30 – 35	0
Veľké Zálužie	B	0	0	0	0	0	0	30	0
Čakajovce	B	0	0	0	0	0	0	15	0

Source: field inquiry, 2009–2011

A – construction of family houses; B – revitalization; C – construction by the form of developer projects; D – construction of housing units

* the second value defines the construction in the locality of Nový Cabaj (local part of the village Cabaj – Čápor)

The localization of new constructions is influenced also by the quality of environment. The paradox is that the construction of new residential areas damages the ecosystems because they are built at the expense of forests or agricultural land. New construction causes also higher consumption of energy and pollution of natural environment (Pucher, 2002 in Sobotová, 2006).

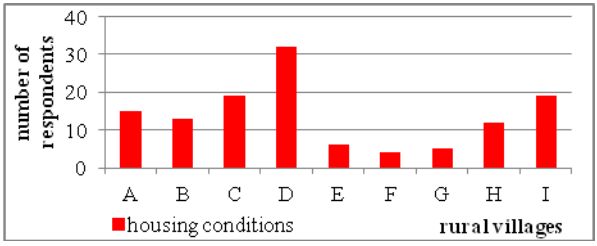
In the rural villages in the area of the Nitra City, the new constructions caused the expansion of the villages by creating new streets and new areas, but it also influenced mixing the urban and rural way of life and lifestyle.

SUBJECTIVE PERCEPTION OF MOTIVATIONAL FACTORS OF MIGRATION FLOWS OF INHABITANTS TO SUBURBAN VILLAGES OF THE NITRA CITY

The questionnaire method of subjective inquiry was realized in the rural villages of the suburban zone of the Nitra City where, currently, the new locality or new zone of construction of family houses or apartments is built and resided indicating the newcomers in the village. Such villages in the area of the Nitra City are totally nine: Nitrianske Hrnčiarovce, Golianovo, Jelšovce, Cabaj - Čápor, Branč, Malý Lapáš, Lehota, Zbehy and Lužianky. When determining the number of respondents of the immigrated residents, we tried to visit each family house in the area of construction of family, but the limiting factor was unwillingness of immigrated residents. Finally, 125 immigrated respondents accepted the cooperation on the research meaning that 1 respondent represents 1 family house.

From the total number of respondents (125), 80 % (100) came from the Nitra City and the rest 20 % had their former residence in other rural village or town. In the villages of Nitrianske Hrnčiarovce, Branč, Golianovo, Lehota, Zbehy and Cabaj – Čápor, we managed to question immigrated residents only from the Nitra City. In the villages of Jelšovce, Lužianky and Malý Lapáš the questions were answered also by residents who did not come only from this city.

When finding the causes of immigration of residents to the villages from the "Report on Migration", we found out that the most common causes of immigration were housing conditions. According to inquiry, this fact was confirmed and from all mentioned choices of answers, the respondents chose the option of housing reasons (Fig. 2).



A – Nitrianske Hrnčiarovce
B – Jelšovce
C – Branč
D – Malý Lapáš
E – Golianovo
F – Lehota
G – Zbehy
H – Cabaj – Čápor
I – Lužianky

Fig. 2: Reason of Immigration of Residents to Suburban Villages of the Nitra City
Sources: Repaská, 2010 – field inquiry

Motivational factors of respondents, which undermined the moving to rural village, were evaluated by the means of 11 indicators where the respondents

expressed their answers using the five-point scale – mark 1 for the highest motivation, mark 5 for the lowest motivation and mark 3 for the average motivation. These indicators were filled with the option "other" where the respondents could write another reason of moving. None of them expressed the opinion to this option; therefore, it was excluded from the research (Tab. 3).

Tab. 3: Motivational Factors of Moving to the Villages of Suburban Zone of the Nitra City

Motivational factors	**Average mark of motivational factors** (1 – the most motivational, 5 – the least motivational)
price of land parcel	1,5
transport accessibility	1,4
natural attractiveness of village	3,5
good services	4,2
closeness of the Nitra City	1,0
work opportunities	5,0
possibility of family house, garden	1,0
cleaner environment and air	2,1
tidying and maintaining only own rooms	2,1
more privacy	2,0
possibilities for breeding animals	3,7
average	**2,5**

Source: Repaská, 2010 – own calculations

Migration of respondents from the Nitra City to the villages of suburban zone influenced mainly the *closeness of the Nitra City* and the possibility to *own the family house with the garden* (1.0) which confirms the basic attributes of suburbanization. By moving to the countryside, people can execute one of their dreams, living in own family house with garden. It was also confirmed by the field research based on which the highest motivation was assigned. The weight of given indicators was highly above-average in each village and ranged from 1.0 to 1.5.

Important is also the *transport accessibility to the city* (1.4). With the exception of the village of Branč, the values of this indicator ranged above-average in all villages. The reason can be the localization of the village which is at a distance of 15 km from the city. Other villages with above-average value of the indicator are localized to 10 km.

The high value (1.5) has also the *price of land parcel*. It is connected with the distance of town, transport accessibility of the village to town, but also with infrastructure of the village. The price of land parcel was the highest motivator of residents for migration mainly in the villages of Jelšovce (1.2), Branč (1.2), Malý Lapáš (1.3), Zbehy (1.8), Cabaj – Čápor (1.8). In these villages, the price of land parcel ranges from 10 € to 33 €/m^2. The price of land parcel was evaluated as above-average also by the residents of the village of Nitrianske Hrnčiarovce (2.2) although the price of land parcel is the highest from all monitored villages and ranges up to 100 €/m^2. The reason could be residing of this village by the residents from higher social groups for whom the high price of land parcel was not so important. The residents from higher social classes move to rural villages and by this we can claim another attribute of suburbanization.

The possibility of *more privacy* was shown in the answers of respondents by the above-average level (2.0). In the villages of Golianovo and Lehota, this indicator gained the highest value (1.0).

When the respondents move to rural villages, also the *cleaner environment and air* (2.1) were important and with the exception of the village of Jelšovce, it reached above-average evaluation.

The indicator of *tidying and maintaining only own rooms* ranged from 1.7 (Nitrianske Hrnčiarovce) to 2.8 (Jelšovce, Branč).

The less relevant indicators of moving the residents to countryside were factors: natural attractiveness of village, possibility for breeding animals, good services and work opportunities. These four indicators range deeply below-average and they motivated the immigrants not much.

In the case of *natural attractiveness of village*, its below-average value was almost in all the villages. The exception was the village of Nitrianske Hrnčiarovce where the average of 2.5 was exceeded by 0.4 points and gained the value of 2.1. It could be because of the attractive mountain of Zobor because the village is located under it. In the rest of the villages, natural attractiveness as a motivational indicator was not important.

In the case of motivational factor of the *possibility for breeding animals*, the most positive were the answers of respondents in the village of Cabaj – Čápor (2.1) where the answer of respondents was above-average.

Regarding the *good services*, the opinion of residents was negative when the below-average value of this indicator was 4.2. In the villages, the indicator ranged from 4.6 to 4.9.

Work opportunities were among the motivational factors the least important. Residents did not move to the village due to employment.

Based on mentioned, we can explicitly claim that in the suburban zone of the Nitra City we can point out the basic attributes of suburbanization which prevailed when immigrating to rural villages:

- housing conditions,
- closeness to the Nitra City,
- good transport accessibility,
- price of land parcel,
- possibility of family house and garden,
- more privacy,
- cleaner environment and air.

CONCLUSION

Migration of residents from the dusty and loud environment of town to the village brings positive and also negative causes. On one side, it can bring revitalization of countryside, but on the other side it brings a separation and segregation of new residents. New residents have often more capabilities of influencing decision-making processes in public issues in village. They often dispose of greater political power as original residents or bring powerful contacts to the village, but also new opinions and views which can help to the development of the village.

Príspevok bol vypracovaný v rámci riešenia projektu VEGA 1/0893/11 Transformácia Nitrianskeho kraja v meniacich sa spoločensko-ekonomických podmienkach a perspektívy jeho regionálneho rozvoja.

Príspevok bol vypracovaný v rámci riešenia projektu UGA VII/49/2011 Vplyv suburbanizácie na vývoj obyvateľstva mesta Nitra.

REFERENCES

[1] CZAKOVÁ, G. 2010. Vyčlenenie obcí suburbánneho zázemia mesta Nitra. In Geographia Cassoviensis, 2010, roč. 4, č. 1, s. 36-42, ISSN 1337-6748.

Motivačné faktory migračných tokov a ich vplyv na sídelnú identitu obyvateľstva v suburbánnej zóne mesta Nitra v rokoch 1998–2006

V rámci subjektívneho i objektívneho výskumu migračných tendencií obyvateľov mesta Nitra do suburbánnych obcí možno bytové podmienky vyjadriť ako jeden z najdôležitejších dôvodov sťahovania sa mestských obyvateľov na vidiek. V obciach sa realizuje silná revitalizácia, individuálna výstavba rodinných domov, ale aj výstavba bytových domov, ktoré slúžia aj pre obyvateľov mesta. Obce suburbánnej zóny mesta Nitra sú lokalizované v blízkej dostupnosti k mestu, resp. majú s mestom spoločné administratívne hranice. Aj preto sa blízka dostupnosť k mestu javila ako jeden z najdôležitejších motivačných faktorov. Samozrejmosťou je aj lacnejšia cena vidieckych pozemkov, dobrá dopravná dostupnosť a možnosť vlastníctva rodinného domu so záhradou. Všetky tieto motivačné faktory patria k najdôležitejším indikátorom suburbanizácie, pretože výrazne ovplyvňujú sťahovanie mestského obyvateľstva na vidiek.

COMPARISON OF SELECTED INDICATORS OF POPULATION HEALTH IN SLOVAKIA AND THE EUROPEAN UNION

Katarína Vilinová, Alena Dubcová

Department of Geography and Regional Development FNS CPU

Trieda A. Hlinku 1, 949 74 Nitra

kvilinova@ukf.sk, adubcova@ukf.sk

Abstract: *This paper deals with comparison of selected indicators of population health in Slovakia and the European Union. The health indicators include those related to the eating habits of the population of Slovakia and the European Union. Food consumption is an important part of human life which largely affects the health. We compared the consumption of meat, milk, wheat, potatoes as well as fruits and vegetables.*

Key words: *health conditions, indicators, consumption, food, Slovakia, European Union*

INTRODUCTION

The inevitable condition for functioning of all metabolic processes in human organism is the food intake. Whether the food intake is sufficient, not only in terms of quantity but also quality, can be monitored by the health condition and structure of the food consumed. Food consumption belongs to the important factors of human existence and development of society. Way of nutrition and its trends in Slovakia have changed in the past under the influence of social and

economic changes. Like in other countries also in our country during post-war years, there was a gradual increase in consumption of animal products, especially meat, at the expense of cereals and potatoes. While the consumption of vegetables and fruits currently records only small increase.

MATERIAL AND METHODS OF THE PAPER

The aim of the paper is to point out the position of Slovakia in the context of the European Union in the consumption of selected foods which are the indicators of population health. The issue of consumption of selected foods in Slovakia was elaborated in the work of Kubicová (2008) who points out the changes in the consumption of certain foods due to several factors. The economic situation and its reflection in food consumption are emphasized in the work of Hutník and Štanga (1998). Consumption of meat and meat products was analyzed in the works of Jurášek (2002) and Krížová (2006). Potatoes and their consumption as another commodity has been the subject in the work of Tibenská (2009). The obtained statistical data were by the means of mathematical and statistical methods processed into graphs. In the paper, we applied mainly the method of analysis which was supplemented by the method of comparison of obtained data in the monitored years.

CONSUMPTION OF SELECTED FOODS

The development of food consumption and thus the overall level of nutrition of our population were influenced by radical changes that have occurred at the beginning of 90s in the whole national economy Štiková et al. (1993). Their consumption is a reflection of several factors. In recent decades, but also nowadays, the food consumption in Slovakia, but also in the world have changed significantly. This trend prevails also today. According to Kubicová 2008), after the year 1998 and Slovakia's accession to the EU, the changes in food consumption, especially in the structure and amount of food consumed per capita, have shown. These changes are influenced by several factors e.g. incomes of population, living standards, price affordability of foods and other. Food consumption as stated by Hutník and Štanga (1998) is, mainly because of current economic situation, the question of the relationship between consumer prices and income development and thus the real demand of the population.

Foods which consumption we monitored include: meat, milk and dairy products, potatoes, cereals, vegetables and vegetable production as well as fruit and fruit products. The total food consumption in Slovakia reached different values (Fig. 1). When we look at them in detail, we can see a decrease in all the selected products. Although in the year 2002, consumption of milk and milk

products, but also potatoes increased. The year 2002 can be viewed as a specific year which is characterized by a significant drop in consumption of vegetables and vegetable products as well as fruit and fruit products. This decrease is replaced by increased consumption of potatoes, meat, and milk. In the year 2006, the level of consumption of potatoes, meat and fruits began to balance and in the year 2007 it reached about the same amount of consumption.

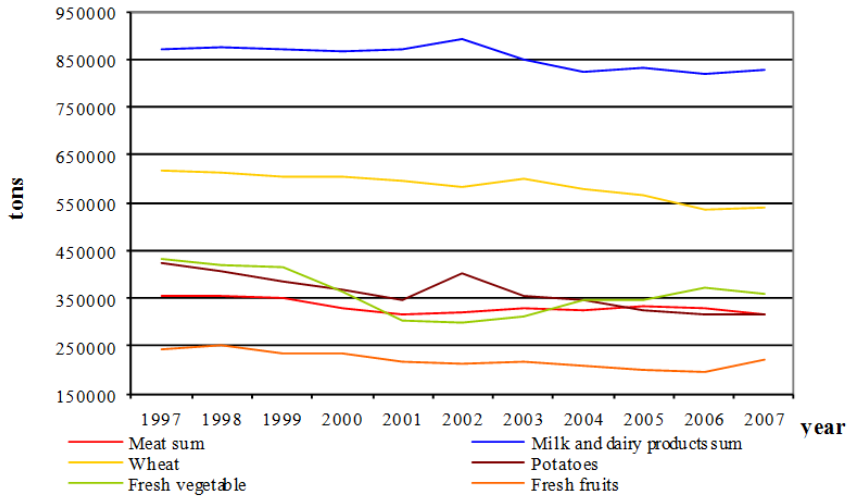


Fig. 1: Total Consumption of Foods in Slovakia (1997-2007)
Source: Statistical Office of the Slovak Republic, 2009; compiled by Vilinová

Meat plays a very important role in the nutrition of the population due to its energy, nutrition and health characteristics. Meat consumption, according to Jurášek (2002), is on one hand considered to be one of the criterions of living standard. On the other hand, it is its high consumption that is the subject of criticism from health care officers due to high intake of fat, cholesterol, etc.

In Slovakia, the consumption of meat and meat products per capita decreases (Fig. 2) and annually (2006–2007), is the consumption of meat decreased by 2.1 kg. In the ten-year period, the highest consumption of meat in 1997 and the lowest in 2007 was recorded. It can be considered as a very positive phenomenon. Regarding the types of meats, the consumption is uneven. The trend of reducing the consumption of beef and veal continued (in 2007 the lower consumption by 21.7 % compared to the year 2003). This phenomenon was influenced mainly by increasing the prices for these types of meats in these years.

In all European countries as well as in Slovakia dominated the consumption of pork and poultry (Krížová, 2006). When comparing the food consumption with

the Recommended Dietary Allowance, we can see that their consumption is not adequate.

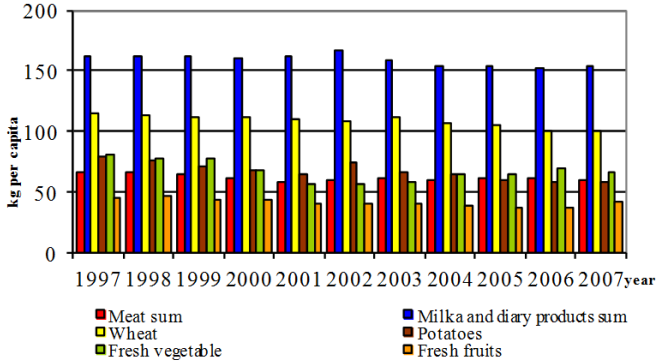


Fig. 2: Consumption of Foods per Capita in Slovakia (1997–2007)
Source: Statistical Office of the Slovak Republic, 2009; compiled by Vilinová

When compared with the recommended amount of pork (22.2 kg per capita per year), the consumption of pork in Slovakia is higher in comparison with the Recommended Dietary Allowance (RDA) by 45.2 %. On the contrary, the consumption of beef (5.4 kg per capita per year) was only 31 % from the RDA which is 17.4 kg per capita per year (Fig. 3).

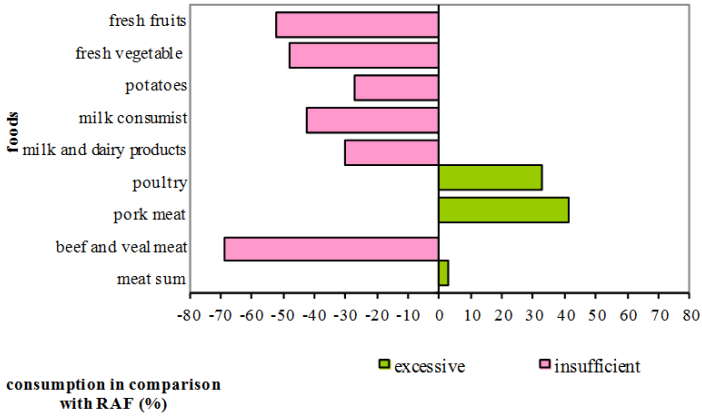


Fig. 3: Consumption of Selected Foods in Comparison with the Recommended Dietary Allowance in Slovakia in 2007

Milk and dairy products are among the most important and most common foods and they also form an important part of nutrition of the population. Regarding the nutrition, they play an important role and are an essential source

of mainly animal proteins, calcium, etc. It belongs to the weakest parts of our nutrition although its consumption among the foods is the highest. Consumption of milk and dairy products is insufficient in Slovakia.

Total consumption of milk and dairy products has reached its maximum (166.2 kg per capita per year) in 2002 (Fig. 1), followed by a period of decline in consumption of this commodity. A positive increase in the consumption is recorded in 2007. Consumption of milk and dairy products reached in 2007 a value of 153.4 kg per capita per year (Fig. 3). Despite the increase, it does not reach the RDA because it is lower by 30.3 % (Tab. 1). Another very important food is wheat which also recorded declining trend in consumption. In 2007, Slovakia consumed a total of 100.1 kg per capita per year.

Potatoes are the fourth basic food in the world. Many people say that it will be an alternative which should in the future make a significant contribution to suppressing the hunger in the world (Tibenská, 2009). The trend of reduction in consumption of potatoes was stopped in 2002 when consumption reached a maximum value (74.8 kg per capita per year). Consumption of potatoes lags behind the RDA by 27.2 %.

Fruits and vegetables are in human nutrition irreplaceable because of its high content of vitamins, minerals, roughage and other important substances positively influencing the physiological processes in our organism. Fruits and vegetables contain a number of important substances for the human body which improve our physical condition, strengthen our immune system and are an excellent source of natural energy. As with previous consumption of commodities, also vegetables and vegetable products are insufficiently consumed. A positive fact can be an increase in the consumption of vegetables in recent years with the exception of the year 2007 (Fig. 1 and Fig. 2). In the year-period (2006 - 2007), there is a reduction in consumption by 2.3 kg per capita per year. In the year 2007, the consumption of this food has reached the value of 66.4 kg per capita which compared to RDA is less by 48.1 % (Tab. 1). Consumption of vegetables fulfils the Recommended Dietary Allowance only in 51.9%.

In the consumption of fruits and fruit products, it is considered positive that the consumption of this commodity increased in 2007. Consumption per capita thus increased by 4.6 kg compared with consumption in 2006 (36.7 kg per capita per year) and in 2007 (41.3 kg per capita per year). This increase represents a positive change in eating this food, but still they do not reach the RDA which has the value of 96.7 kg. Consumption of fruits thus reaches 42.7 % of RDA which means that it is adversely low.

Comparison of Slovakia and other EU countries in the consumption of selected commodities that affect the health of the population is characterized by

unfavorable situation in Slovakia. We lag behind in consumption of all observed food commodities. The biggest differences are mainly in the consumption of milk (Fig. 4b), but also potatoes (Fig. 4c). The consumption of these foods ranks Slovakia to the last places. The opposite phenomenon occurs in the consumption of wheat because in 2007 the consumption of this food ranked Slovakia in the first half of the EU countries with high consumption.

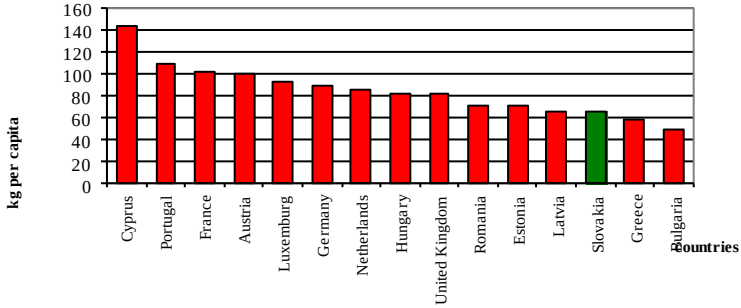


Fig. 4a: Consumption of Selected Foods per Capita in the EU Countries in 2007 – meat

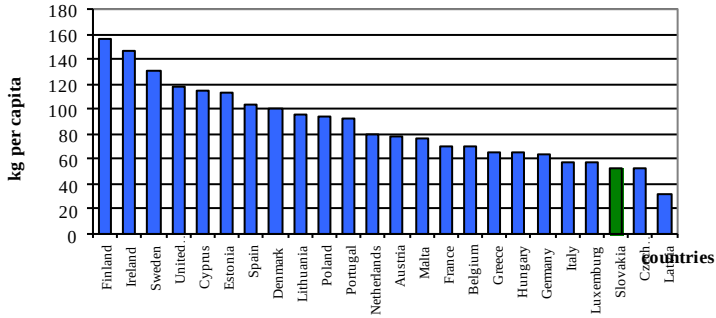


Fig. 4b: Consumption of Selected Foods per Capita in the EU Countries in 2007 – milk

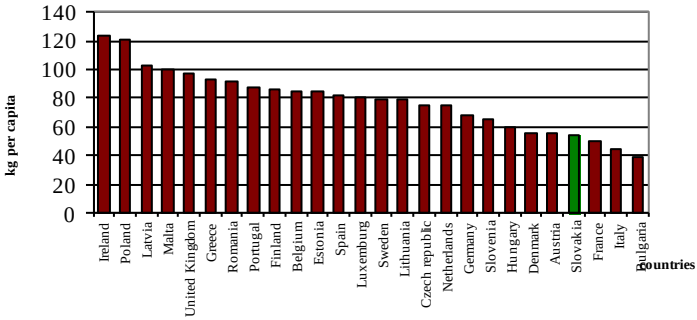


Fig. 4c: Consumption of Selected Foods per Capita in the EU Countries in 2007 – potatoes
Source: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

CONCLUSION

For comparison of the current health condition of the population of Slovakia and the health condition of the population of the European Union, we chose indicators related to the consumption of selected foods that are very closely linked to population health. Their insufficient or excessive consumption reflects greatly on health condition. In this paper, we pointed out the different eating habits connected with consumption of meat, milk, potatoes, wheat in Slovakia and in the EU countries.

We can say that regarding the food commodities in Slovakia, the worst situation was in the consumption of milk because its consumption was, comparing to the EU average, lower by 34.4 kg per person. We lag behind the EU average also in the consumption of potatoes and particularly by 23.8 kg per person. It seems that very negative is consumption of meat because it was consumed by the Slovaks in 2007 by 19.6 kg more when compared to the EU.

REFERENCES

[1] BALÁŽ J., 1992. Všeobecná hygiena potravín a racionálna výživa. Košice: UVL, 1992

[2] DANKOVÁ, Š. 2010. Výberová šetrení o zdravotním stavu v ČR a v Evropě. [online]. Dostupné na internete. http://www.demografie.info/?cz_detail_clanku&artclID=357 [cit. 2010.10.12]

[3] HUTNÍK, F., ŠTANGA, R. 1998. Stav a perspektívy potravinového hospodárstva na Slovensku. In Ekonomický časopis. Bratislava. Slovak Academic Press, spol. s. r. o. 1998.

[4] JURÁŠEK, P. 2002. Sebestačnosť v potravinách. Bratislava: Výskumný ústav ekonomiky poľnohospodárstva a potravinárstva. 2002. s.143, ISBN 80-8058-236-X

[5] KRÍŽOVÁ, S. 2006. Vývoj spotreby jednotlivých druhov mäsa v SR a krajinách Európskej Únie. In Ekonomika poľnohospodárstva, VI., 2006., č.3, s.51-58., ISSN 1335 – 6186

[6] KUBICOVÁ, Ľ. 2008. Vývoj spotrebiteľského dopytu po potravinách. Slovenská poľnohospodárska univerzita. Nitra : s. 85, ISBN 978-80-552-0092-7

[7] ŠTIKOVÁ, O. a i. 1993. Vývoj spotřeby potravin a výživa obyvatelstva. In: Zemědelská ekonomika, roč. 39., č. 2, s.155-167

[8] TIBENSKÁ, H. 2009. Zemiaky. Situačná a výhľadová správa k 31.12.2009. Výskumný ústav ekonomiky poľnohospodárstva a potravinárstva. Bratislava. s.24 – 25. ISSN 1337-4494

Komparácia vybraných ukazovateľov zdravotného stavu obyvateľstva Slovenska a Európskej únie

Vo všetkých sledovaných druhoch spotreby potravín mäsa, mlieka, zemiakov, pšenice, ovocia a zeleniny sme na Slovensku v danom období (1997–2007) s výnimkou ovocia zaznamenali pokles ich spotreby. Dlhodobo bola zaznamenaná vysoká spotreba mäsa, ktorá má veľmi dôležitú úlohu vo výžive obyvateľstva. Aj pri tejto spotrebe sme výnimku zaznamenali u hovädzieho a teľacieho mäsa, pretože ich spotreba je v porovnaní s bravčovým a hydinovým mäsom nižšia. Za pozitívny jav možno považovať zvýšenie v spotrebe mlieka v roku 2007, aj preto, sme sa medzi krajinami Európskej únie umiestnili mezi tými, ktorých bola spotreba najnižšia. Aj spotreba zemiakov ako dalšej sledovanej komodity patrila na Slovensku k tým najnižším medzi krajinami EÚ.

USE OF SELECTED GIS EXTENSIONS FOR THE ANALYSIS OF SECONDARY LANDSCAPE STRUCTURE OF THE HANDLOVÁ TOWN

Jana Oláhová, Matej Vojtek, Martin Boltižiar

Department of Geography and Regional Development, Faculty of Natural Sciences, Constantine the Philosopher University in Nitra

Tr. A. Hlinku 1, 949 74 Nitra

jana.olahova@ukf.sk, matej.vojtek@ukf.sk, mboltiziar@ukf.sk

Abstract: The aim of the paper is to point out to the use of selected extensions in geographic information systems which enable to make the time-consuming computations within the analysis, evaluation and interpretation of the secondary landscape structure more effective. Based on vectorized maps, it is possible, by means of particular extensions and GIS software, to calculate the number, shape, size, diffusiveness, diversity, neighborhood relations or other indexes of landscape. In the paper, we deal with the extensions V-LATE, Patch Analyst, and StraKa. The mentioned extensions were used for the analysis of the secondary landscape structure of the Handlová town. The results of computations are subsequently analyzed in the paper.

Key words: landscape structure, geographic information systems (GIS), extensions of GIS

INTRODUCTION

The secondary landscape structure contains wide-ranging set of those physical elements of landscape which currently fill the Earth's surface. Secondary landscape structure, sometimes referred to as current landscape structure, is a set of natural and man-made partially or completely altered dynamic systems as well as newly created artificial elements (Ružička, Ružičková, 1973). It is made up of landscape elements – the basic spatial units which are the elements of land use.

The landscape elements are mostly grouped into six basic groups that can be, according to the level, scale, intensity and objectives of the research, divided in more detail. Aspects for the division of groups of landscape elements can vary e.g. environmental, biotic, physiognomic, functional, systemic, economic, etc. (Ružička, 2000a, 2001). There are various approaches or methods of research used for the evaluation and analysis of secondary landscape structure.

One of the possible approaches to analyze the secondary landscape structure and its material objects (elements) is its mapping which allows connection to temporal and spatial aspects in relation to the landscape. At present, we cannot imagine the extensive research of secondary landscape structure without its mapping. The map can serve to show mainly types of elements, phenomena, processes and their spatial distribution (Midriak, 1983). This allows subsequently examining the mutual relationships among the displayed elements of the secondary landscape structure and selected characteristics of spatial subsystems of the primary landscape structure and undergoing their quantification.

When making the secondary landscape structure maps, we can use topographic maps of respective scale as a basis from which we can map most of the elements. They must be new, detailed, and accurate enough, which is not the case of some of the Basic maps of SR. For their precision or actualization of individual groups of elements, the field research can be used.

After the creation of the map of the secondary landscape structure, which corresponds to the current state or condition to a certain time period reflecting in a certain scale appropriate or desired degree of detailization, we can proceed to its evaluation and assess the following indicators (Ružička, 2000b):

- number of elements, their spatial size – areal share of individual elements or groups of elements in the acreage (ha, m^2) and the percentage for the whole monitored area or for the individual regional units defined on the basis of certain criteria of regionalization, or for synthetic units e.g. abiocomplexes, types of natural landscape, etc.,
- the degree of heterogeneity and homogeneity of the structure which can be expressed using the grid method – the number of landscape elements in each grid square,
- length of contact lines, boundaries among the elements or groups of elements,
- differences between the original map or the map of reconstructed vegetation with the map of the secondary landscape structure to determine the degree of anthropogenic changes in the landscape.

At present, the classification and quantification of the different elements of landscape structure is being realized by the means of GIS.

When evaluating the landscape, the term "landscape heterogeneity" is being used frequently. Spatial heterogeneity (diversity, richness) of the landscape is today generally regarded as one of the crucial factors of species (biotic) diversity (biodiversity) and sometimes the ecological stability of landscape

ecosystem. The secondary landscape structure of the territory can have homogeneous or heterogeneous distribution of the landscape elements. Some of these elements can be grouped in one place of a large territory and others can be equally situated on the whole area. The heterogeneity of the secondary landscape structure can be assessed in different spatial units. The most commonly used is regular network of squares to n-squares etc. (Griffith, Martinko, Price, 2000, Forman, Godron, 1993, Pucherová, 2004, etc.).

When analyzing the secondary landscape structure and its changes, the focus can be put also on evaluation of the indicators of spatial structure of polygons according to works of Forman (1995), Forman, Godron (1993), McGarigal (2002), McGarigal, Marks (1995). Polygons (elements) can be characterized using various indicators or indexes which are currently an explicit part of some GIS software tools. Unlike the summary of changes in landscape elements of the secondary landscape structure (e.g. a change in the proportion of forest, grassland, arable soil, etc.), they monitor the changes in the number of landscape elements of different categories, their average size, distribution, continuity, mosaic, etc. which are all the characteristics that have a significant impact on the functioning of landscape processes (Lipský, 1999). Many of the above mentioned steps of characterized methodological approaches appear suitable also for the study and evaluation of secondary landscape structure for different types of landscapes as well as their development and changes.

The aim of the paper is to point to the use of selected extensions in GIS for the analysis, evaluation and interpretation of secondary landscape structure in the Handlová town.

STUDY AREA

Handlová town is located in the Trenčín Region where it belongs to the Prievidza District. It has an area of 8579 ha which makes it the largest town in the district of Prievidza (Map 1). The road I. class leads through the town and connects it with the towns of Prievidza and Žiar nad Hronom. There is also a regional railway Prievidza – Horná Štubňa. In the territory, four geomorphological units extends: Kremnica Mountains, Žiar, Hornonitrianska Basin, and Vtáčnik.

Map 1: Study area

SELECTED EXTENSIONS USED FOR THE EVALUATION OF SECONDARY LANDSCAPE STRUCTURE OF THE HANDLOVÁ TOWN

The first step in the preparation of background materials for their evaluation in geographic information systems is digitization (conversion from analog to digital form). Maps in digital form are obtained by scanning of paper maps in required quality (min. 300 dpi) and saved in the format (e.g. TIFF, JPG) that is compatible with the GIS software.

The next step is to assign geographic coordinates to digital maps – georeferencing. After georeferencing, the creation of polygon layer follows – layer of the landscape structure from which by the means of extensions

(toolboxes) in GIS we come to different evaluations and analyses of landscape structure.

When analyzing and evaluating the secondary landscape structure of the Handlová town, we used following GIS extensions (Pechanec, Pavková, Dobešová, 2008):

StraKa is a GIS toolbox for the analysis of landscape structure. It represents a programmed set of solutions for complex formulas collectively published by Forman, Gordon (1993). The tool is designed in the form of toolbox – user extension of ArcGIS software and is fully functional under ArcInfo license. In the basic ArcView license only the tools of Geometry, Number of Entities, Statistics and Shape of Patch work. Toolbox is divided into two toolsets: Index of landscape and Description of landscape. Toolbox was created during 2007 – 2008 at the Department of Geoinformatics, Palacky University in Olomouc.

Vector-based Landscape Analysis Tools Extension (V-LATE) provides a set of frequently used so-called metric functions (landscape indexes) to study and determine the landscape structure. Extension was developed within the SPIN project at the University of Salzburg in GIS laboratory of the Department of Geoinformatics. The extension works with vector-based data of polygon topology having shapefile format (*.shp). GRID and geodatabase files are not supported. Extension button is inactive until a polygon layer is added into ArcMap project. Projection on-the-fly is not yet supported by this extension and it works only with the projected data. When working with a large number of polygons (more than 1500 polygons), the process of calculations is much longer. If the classes are not explicitly expressed in the attribute table, the extensions are automatically generated.

Patch Analyst is extension which allows spatial analysis of the landscape, supports the modelling of habitats, biodiversity conservation, and forest management. Patch Analyst for ArcGIS is also available in two versions: *Patch* for processing of polygon layers and *Patch Grid* for raster (grid) layers. Menu of Patch Analyst version 3.12 consists of 12 functions which are divided into four thematic groups. The first group includes production of new layers, functions. The second group deals with setting the parameters. The third group works with attribute modeling. The fourth group works with spatial operations.

RESULTS

For the analysis and interpretation of the secondary landscape structure of study area, we used maps from the year 1984.

Using the above mentioned extensions, we computed the following indexes: Core Area (CA), Mean Patch Size (MPS), Patch Size Standard Deviation (PSSD), Edge Density (ED), Total Edge (TE), Mean Patch Edge (MPE), Mean Shape Index (MSI), Mean Perimeter-Area Ratio (MPAR), Mean Fractal Dimension (MFRACT), Shannon's Diversity Index (SDI), and Shannon's Evenness Index (SEI). All these indexes are part of V-LATE and Patch Analyst extensions, but StraKa extension contains only indexes Mean Patch Edge (MPE) and Mean Shape Index (MSI) (Tab. 1).

Tab. 1: V-LATE, StraKa and Patch Analyst – Results of Computations

	V-LATE / Patch Analyst	
	CA	8579
	MPS	9,42
	PSSD	117,22
	TE	1018806
StraKa	MPE	1118,34
	MSI	1,61
	MPAR	1161,65
	MFRACT	1,42
	SDI	1,69
	SEI	0,47
	ED	118,76

Source: Oláhová, 2011

V-LATE extension contains, except the listed indexes in Tab. 1, the following, indexes: Richness, Rel. Richness, Dominance, index of landscape division (Division), distribution index (SPLIT), the size of actual network (MESH) (Tab. 2).

Tab. 2: V-LATE – Results of Computations

Diversity Analysis - landscape level	Richness:	36
	Rel. Richness (%):	100
	Dominance:	1,893
Class form analysis	DIVISION	53,95
	SPLIT	8,66
	MESH	1002577,28

Source: Oláhová, 2011

Patch Analyst, in addition to indexes in Tab. 1, contains the following indexes: Area Weighted Mean Shape Index (AWMSI), Median Patch Size (MedPS) Patch Size Coefficient of Variance (PSCoV), and Area Weighted Mean Patch Fractal Dimension (AWMPFD) (Tab. 3).

Tab. 3: Patch Analyst – Results of Computations

Patch Analyst	AWMSI	5,39
	MedPS	0,21

Source: Oláhová, 2011

Straka extension contains, in addition to those indices in Tab. 1, two more indexes: relative area (Rel. Area) and accessibility of patches (Ai) (Tab. 4).

Tab. 4: StraKa – Results of Computations

StraKa	Ai	1067,34
	Rel. Area	0,11

Source: Oláhová, 2011

After the basic statistical analysis of thematic maps of the secondary landscape structure of study area, we reached the following findings and knowledge.

Groups of landscape elements (patches) of the secondary landscape structure in the area of interest occupy an area of 8579 ha and the number of all patches in the territory is 911. The average size of patch in whole area is 9.42 ha. Total number of landscape elements in individual groups and subgroups of landscape elements is 37.

Patch Size Standard Deviation (PSSD) has a value of 117.22 ha which means that patches in the study area have various sizes. Edge Density of patches (ED) is 1018806.08 m thus the density of patches per unit area is high. The Mean Shape Index of patches (MSI) is 1.61 which results in irregular shape of patches. The Mean Fractal Dimension of patches (MFRACT) is 1.42 - if the value is closer to 1, the perimeter of patches is simple and if the value is closer to 2, the perimeter of patches is more complex. Area Weighted Mean Patch Fractal Dimension (AWMPFD) has a value of 1.37 and it is assessed equally as index MFRACT. Shannon's Diversity Index (SDI) has a value of 1.69 - if SDI is equal to 0, it is represented by only one type of patch and when the value is higher, the number of patch types increases. Shannon's Evenness Index (SEI) has a value of 0.47 - if the spatial distribution of patches is uniform, it approaches the value 1. Dominance has a value of 1.893 - high value indicates that the landscape is dominated by few landscape elements and when the values is close to 0, it indicates that there are several types of elements with the same share of area in the landscape. Index of landscape division (DIVISION) has a value of 53.95, the division index (SPLIT) is 8.66 and the size of actual

network (MESH) is 1002577.28. Accessibility of patch (Ai) has a value of 1067.34 m which is the possible extent of accessibility of the patch with the surrounding area, and the relative value is 0.11. Area Weighted Mean Shape Index (AWMSI) has a value of 5.39 and it is evaluated equally as MSI. Medium Patch Size (MedPS) is 0.21 ha and Patch Size Coefficient of Variance (PSCoV) is 1244.79 ha.

CONCLUSION

Results processed as GIS layers, with regard to their thematic content, can be potential inputs to the many GIS applications and statistical analyses, syntheses, prognoses, and decision making processes. Maps of secondary landscape structure e.g. have valuable potential for detailed comprehensive geo-ecological research on a large scale. The information layers and databases can be used to create synthetic maps of e.g. geo-ecological complexes, or as partial inputs for various geo-ecological, landscape-ecological evaluations such as landscape properties: sensitivity, capacity, ecological stability, vulnerability to natural hazards, etc.

The science and technology have developmental character which is similar with the geographic information systems which are being upgraded and updated with new extensions that allow geographers to carry out their work or research more accurate and easier as it was before. In our paper we dealt with GIS extensions which are useful for the evaluation and analysis of the secondary landscape structure and can replace the work with lengthy calculations.

The paper was elaborated within the projects:
VEGA 1/0893/11 Transformácia Nitrianskeho kraja v meniacich sa spoločensko-ekonomických podmienkach a perspektívy jeho regionálneho rozvoja
UGA -> VII/28/2011 Zmeny krajinnej štruktúry v obci Ráztočno

REFERENCES

[1] FORMAN, R. T. T. Land Mosaics: The Ecology of Landscape and Regions. New York: Cambridge University Press, 1995. 632 s.

[2] FORMAN, R. T. T., GODRON, M. Krajinná ekologie. Praha: Academia, 1993. 583 s.

[3] GRIFFITH, J. A., MARTINKO, E. A., PRICE, K. P. Landscape Structure Analysis of Kansas at Three Scales. In: Landscape and Urban Planning, roč. 52, 2000, č. 1, s. 45-61.

[4] LIPSKÝ, Z. Krajinná ekologie pro studenty geografických oborů. Praha: Karolinum, 1999. 129 s.

[5] MCGARIGAL, K. Landscape Pattern Metrics. In: El-Shaarawi, A. H., Piegorsch, W. W. (eds.): Encyclopedia of Environmetrics. Volume 2. England: John Wiley & Sons, 2002. s. 1135-1142.

[6] MCGARIGAL, K., MARKS, B. J. FRAGSTATS: Spatial Pattern Analysis Program for Quantifying Landscape Structure. Gen. Tech. Rep. PNW-GTR-351. Portland: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 1995. 122 s.

[7] MIDRIAK, R. Morfogenéza povrchu vysokých pohorí. Bratislava: Veda, 1983. 516 s.

[8] PECHANEC, V., PAVKOVÁ, K., DOBEŠOVÁ, Z. Straka a spol. – GIS nástroje pro analýzu struktury krajiny. In: ÚSES - zelená páteř krajiny, roč. 7, 2008.

[9] PUCHEROVÁ, Z. Vývoj využitia krajiny na rozhraní Zobora a Žitavskej pahorkatiny (na príklade vybraných obcí). Nitra: FPV UKF v Nitre, 2004. 147 s.

[10] RUŽIČKA, M. The principles and criteria of landscape-ecological method LANDEP. In: Ekológia (Bratislava). Bratislava: ÚKE SAV, 19, Supplement 2, 2000a. s. 18-22.

[11] RUŽIČKA, M. Krajinnoekologické plánovanie - LANDEP I. (Systémový prístup v krajinnej ekológii.). Nitra: Biosféra, 2000b. 120 s.

[12] RUŽIČKA, M. Krajinná štruktúra ako základ ekologických podkladov o krajine. In: Izakovičová, Z. (Ed.): Zmeny krajinnej štruktúry v kontexte trvalo udržateľného rozvoja. Bratislava: ÚKE SAV, 2001. s. 5-13.

[13] RUŽIČKA, M., RUŽIČKOVÁ, H. Štúdium druhotnej krajinnej štruktúry na príklade modelovaného územia. In: Problémy biológie krajiny 12. Bratislava: Veda, 1973. s. 5-22.

Aplikácia vybraných extenzií GIS pri analýze druhotnej krajinnej štruktúry mesta Handlová

Druhotná krajinná štruktúra mesta Handlová je výsledkom dlhodobého pôsobenia najmä antropogénnych, ale aj prírodných činiteľov na zložky krajiny. Výsledkom týchto vzťahov sú skupiny prvkov DKŠ, ktoré možno charakterizovať ako kvalitatívne rôznorodé areály v krajine, prejavujúce sa najmä odlišnými fyziognomickými a štruktúrnymi (obsahovými) znakmi či biofyzikálnou podstatou. Fyziognomické, štruktúrne znaky, biofyzikálnu podstatu, ako aj iné vlastnosti krajiny môžeme charakterizovať pomocou rôznych GIS extenzií. V našom príspevku sa venujeme trom extenziám pre analýzu a hodnotenie DKŠ, a to extenziu StraKa, V-LATE a Patch Analyst.

Získavané informácie o prvkoch DKŠ a ich ukladanie v periodicky aktualizovanej databáze GIS poskytujú priestorový obraz o krajine a jej ráze. Možno ju tiež dopĺňať, upravovať a rozširovať podľa potreby konkrétnych úloh (projektov, plánov, návrhov). Mapové vyjadrenie a korektné štatistické výsledky taktiež potvrdili, že údaje reprezentované mapami z roku 1984, poskytujú cenné údaje a sú spoľahlivým zdrojom informácií pre mapovanie a hodnotenie DKŠ v regionálnych až lokálnych mierkach.

ANALYSIS OF DIFFERENTIATION FUNCTIONAL AREAS OF CITY OLOMOUC IN TIME PERIOD 1930–2010

Jana Svobodová, Martin Klícha, Jakub Miřijovský

Department of Geoinformatics, Faculty of Science, Palacký University in Olomouc,

tr. Svobody 26, 771 46, Olomouc, Czech Republic

j.svobodova@upol.cz, manas.klicha@gmail.com, jakub.mirijovsky@upol.cz

Abstract: *The basic idea of the study was to use the innovative geostatistical methods, rather local cluster analysis, in the field of urban planning and city development analysis. In the study, the input data were functional areas of housing, public facilities, industry and green areas of the city Olomouc (Czech Republic) from different time periods (1930, 1955, 1985, 1999 and 2010). The result of the study is the delimitation of core areas of individual types of functional areas, i.e. places that show the highest stability in terms of functionality in the reporting period. The increase or decrease the importance of selected function is than possible to observe by other areas.*

Key words: *local cluster analysis, Getis – Ord Gi*, functional areas, urban planning, GIS*

1. INTRODUCTION

A cluster analysis is a multivariate statistical method that is used to classify objects into groups or clusters. The main principle of this type of analysis is the clustering of individual elements which are the most similar. Local (spatial) cluster analysis works than with the spatial component of data and thus it is suitable for working with geographic data. In the current literature, using of the local cluster analysis methods can be found most often in the field of health or biology (Anselin 1995, Longley and Batty 1996). Further, Spurná (2008) used local cluster analysis in the social geography; Chu et al. (2009) used it in the physical geography to determine areas susceptible to landslides.

The main aim of this study was to use the local method of cluster analysis to monitor the occurrence of statistically significant clusters of selected functional areas within the city of Olomouc. Two methods of local cluster analysis are accessible in the used environment of ArcGIS Desktop v. 10. The first one identifies only clusters with values similar in magnitude or spatial outliers. It does not deal with the magnitude. However, the second one identifies clusters of features with high values (hot spots) and clusters of features with low values (cold spots). The second mentioned method was used for processing the study with the regard to that the sub-aim of the study was to find places with high (or low) concentration of functional areas of given type.

1.2 GETIS – ORD GI* METHOD

The method Gi*, called Hot spot analysis, identifies statistically significant spatial clusters with high values (hot spots) and spatial clusters with low values (cold spots) (Getis and Ord, 1996). The output from an analysis (in ArcGIS Desktop v. 10) are values of z-score and p-value for each feature that measure statistical significance of spatial clustering (index Gi* correspond to z-score). In effect, they indicate whether the observed spatial clustering of high or low values is more pronounced than one would expect in a random distribution of those same values. A high z-score and small p-value (e.g. p-value < 0,05) for a feature indicates a spatial clustering of high values. A low negative z-score and small p-value indicates a spatial clustering of low values. The higher (or lower) the z-score, the more intense the clustering. A z-score near zero indicates no apparent spatial clustering (ArcGIS Resource Center, 2011). Getis and Ord (1992) state the relationship for the calculation of z-core (Gi *).

2. INPUT DATA AND PREPROCESSING

The set of input data representing the functional areas of housing, public facilities, industry and greenery of a city Olomouc was taken by digitization of historical urban plans from years 1930, 1955, 1985 and 1999 and the current urban plan from 2010 provided by the Municipality of Olomouc. However, individual urban plans included different classification of functional areas. The generalization of attributes into 4 categories was conducted for the purposes of the study: housing (collective, individual), public facilities (civil facilities, culture, services, physical education and sport, public administration, education, health), production areas (manufacturing, warehousing) and greenery (landscape greenery, urban greenery, etc.).

The expression of an intensity of the phenomenon was the main step in preparing data for entry into the local cluster analysis. The mere

occurrence/non occurrence of the phenomenon (here the type of functional areas) is not suitable for cluster analysis as the input value. The solution for expression of the intensity in the data was the division of functional areas using a regular hexagonal network and calculation of the percentage of each category of functional areas in each field. The values for only one type of functional areas entered into the subsequent analysis. The size of one small field was set at 0,04 km^2. It ensures a sufficient variability of input data.

3. LOCAL CLUSTER ANALYSIS

The local cluster analysis of functional areas of housing, public facilities, production areas and greenery was preformed above preprocessed data for each year (1930, 1955, 1985 1999 and 2010). In the first phase the analyses were always performed for the entire cadastral territory in a given year. In the second phase, they were carried out also for the extent of cadastral territory of the city Olomouc in 1930 (only for the functional areas of housing) for a better opportunity to monitor the development of the clusters. In total thus 24 analyses. The same size of the cadastral territory for all years was used in the second phase because the results of local cluster analysis (i.e. distribution of clusters) are highly dependent on the extent of input area and location of the input analyzed elements.

3.1 ANALYSIS OF FUNCTIONAL AREAS OF HOUSING

The functional areas of housing are clustering since 1930 in locations that become very important centres (clusters) of housing in later years (fig. 1). In 1930, the statistically significant clusters were found in areas of Neředín, Nová Ulice and Povel and smaller clusters than in areas of Nové Sady, Hodolany, Bělidla and Pavlovičky. In later years, in connection with the growth of the cadastral area, the statistically significant clusters were identified especially in housing estate in locality of Neředín, Nová Ulice and Povel. An analysis of the year 2010 showed that significant clusters of functional areas of housing have been located also in the associated municipalities. This phenomenon was caused mainly by the fact that there was no major expansion of housing into locations of housing estate. For this reason, there was a logical concentration primarily individual housing into outlying parts of the cadastral area of Olomouc. The significant change of clustering was obvious especially from analyses performed above data from 1999 and 2010 for the extent of cadastral territory of the city Olomouc in 1930 (fig. 2). In 2010 the dominant function of housing decreases in locations Neředín and Nová Ulice in comparison with 1999 and other functions start assert oneself here.

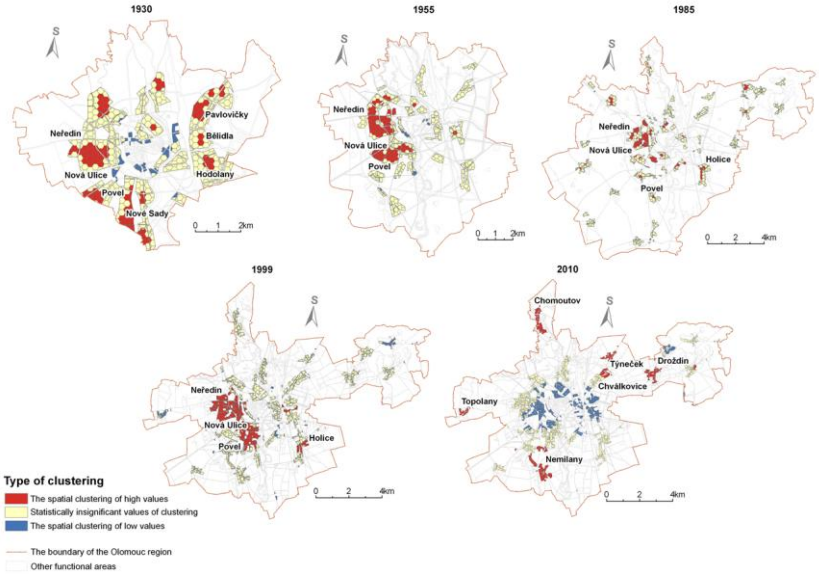


Fig. 1: Local cluster analysis of housing above cadastral territory in a given year

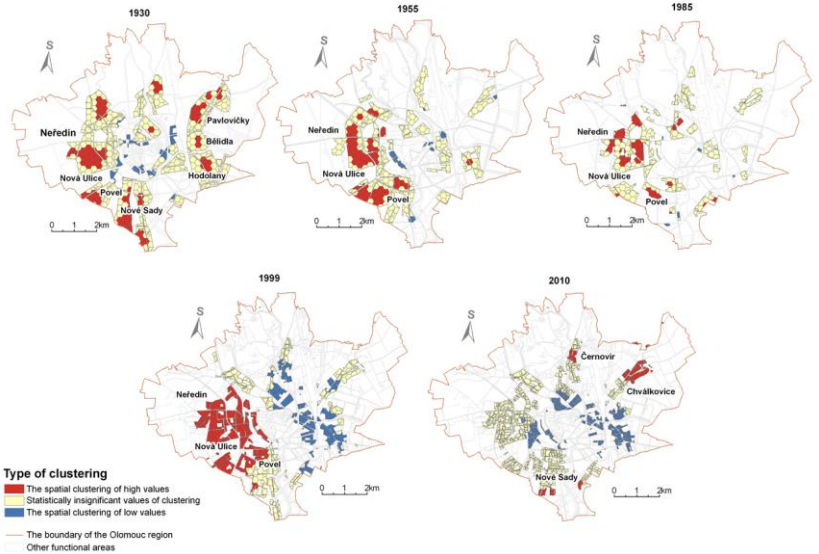


Fig. 2: Local cluster analysis of housing above the cadastral territory of the city Olomouc in 1930

3.2 ANALYSIS OF OTHER TYPES OF FUNCTIONAL AREAS

Unlike the functional areas of housing, the area of other types of functional areas is much smaller and therefore, a larger scale would be necessary to use for presentation the map outputs from this analyses. For this reason, the map outputs are not presented here.

Statistically significant clusters of functional areas of public facilities (services) were identified in later years. Among 1955-1999 it was mainly clusters in locality of Nová Ulice (area of hospital), Hejčín (Andr stadium, swimming pool, ice stadium) and Envelopa (the buildings of Palacký University). In 1999, the newly formed cluster was located at Svatý Kopeček and ZOO.

Since 1930, the statistically significant clusters of production areas were quite logically localized especially in the industrial zone in eastern and southeastern part of Olomouc in the localities of Bělidla, Hodolany a Nový Svět by the cluster analysis. In later years, a statistically significant cluster of new production areas was identified in the locality Řepčín. The massive industrialization was apparent from the analyses between 1985 and 1999. A large increase of the size of production areas contributed noticeably to the localization of new statistically significant clusters.

The statistically significant clusters of greenery functional areas were located using the analyses at areas of large forests and orchards. In 1930, it was mainly locality of Černovír (fens) and also parks in the center of city Olomouc (Smetana park, Čech and Bezruč park). In 1985, new statistically significant cluster was identified at Svatý Kopeček northeast from Olomouc. Large areas of forest appeared there as a result of the enlargement of cadastral boundaries. Then in 1999, another cluster was identified in the locality north of Řepčín near Poděbrady pond. The structure of greenery functional areas was not changed so much in other periods; also clusters did not change much.

4. CONCLUSION

The main aim of this study was to use the local method of cluster analysis to monitor the occurrence of statistically significant clusters of selected functional areas within the city Olomouc in different time periods (1930, 1955, 1985, 1999 and 2010). ArcGIS Desktop v. 10 was used to apply the local cluster analyses; it includes a method Getis – Ord Gi* in a frame of Spatial Statistic toolbox. Functional areas of housing, public facilities, production areas and greenery were selected for processing of case studies. Before starting the analysis, the data had to be adjusted because an attribute which enters into the analysis must contain information about the intensity of the analyzed phenomenon.

In total 24 analyses were performed: four analyses for each type of functional area in five different time periods above the entire cadastral territory in a given year and than four analyses of functional areas of housing (in 1955-2010) above the extent of cadastral territory of the city Olomouc in 1930.

The Olomouc city had already in 1930 a fixed settlement and functional spatial structure which logically expanded in later years. In this year, the main statistically significant clusters of housing, public facilities, production areas and greenery were relatively well localized. It is evident from the resulting cluster analyses of functional areas above the cadastral territory of Olomouc.

REFERENCES

[1] ANSELIN, L. Local indicators of spatial association – LISA, Geographical Analysis, Ohio State University Press, 1995, 27, p. 93-115.

[2] ArcGIS Resource Center. *Web-based help* [online]. [cit. 2011-08-19]. URL: <http://resources.arcgis.com/content/web-based-help>.

[3] GETIS, A., ORD J. K. The Analysis of Spatial Association by Use of Distance Statistics, Geographical Analysis, Ohio State University Press, vol. 3, 1992. p. 189-206.

[4] GETIS, A., ORD J. K. Local spatial statistics: an overview. In John Wiley and Sons (eds.), Spatial Analyse: Modeling in a GIS Environment. 261 p.

[5] CHU, Ch.-M., TSAI, B.-W., CHANG, K.-T. Integrating Decision Tree and Spatial Cluster Analysis for Landslide Susceptibility Zonation. Engineering and Technology, 59, 2009. p. 479-483.

[6] LONGLEY, P, BATTY, M. Spatial analysis: modelling in a GIS environment. New York, John Wiley & Sons, Inc, 1996. 352 s. ISBN 0-470-23615-9.

[7] SPURNÁ, P. Prostorová autokorelace – všudypřítomný jev při analýze prostorových dat? Czech Sociological Reviw, Praha: Sociologický ústav AV ČR, v.v.i., vol. 44, no.4., 2008. p. 767-787.

Analýza diferenciace funkčních ploch města Olomouc v letech 1930–2010

Hlavním cílem studie bylo využití lokálních metod shlukové analýzy pro sledování výskytu statisticky významných shluků vybraných funkčních ploch v rámci města Olomouc v různých časových obdobích a to v letech 1930, 1955, 1985, 1999, 2010. Pro tvorbu shlukových analýz byl využit program ArcGIS Desktop, konkrétně nástroj Hot Spot Analysis z toolboxu Spatial Statistic, který využívá metodu Getis – Ord GI*. Pro příkladové studie byly vybrány funkční plochy bydlení, veřejného vybavení, výrobních ploch a zeleně. Před samotným spuštěním analýz musela být data nejprve upravena a to

především z důvodu, že do analýzy vstupuje atribut, který musí obsahovat informaci o intenzitě analyzovaného jevu.

Celkem bylo provedeno 24 analýz: čtyři analýzy pro každý typ funkční plochy v pěti různých obdobých v rozsahu katastrálního území Olomouce v daných letech a poté další čtyři analýzy funkčních ploch bydlení (v letech 1955-2010) pouze na katastrálním území Olomouce z roku 1930.

Z výsledných shlukových analýz vybraných funkčních ploch na katastrálním území Olomouce je patrné, že Olomouc měla již v roce 1930 pevně danou sídelní i funkční prostorovou strukturu města, která se v pozdějších letech logicky rozšiřovala. Byly poměrně přesně lokalizovány statisticky významné shluky bydlení, veřejného vybavení, výrobních ploch a zeleně v daných letech.

THE HISTORICAL 3D MAP OF LOST OLOMOUC FORTRESS CREATION

Stanislav Popelka, Alžběta Brychtová

Palacký University in Olomouc

Tr. Svobody 26, 771 46

Standa.Popelka@gmail.com, alzbeta.brychtova@gmail.com

Abstract: *3D Visualization of historical objects, cities and landscapes are used in many fields of human activity. The content of this paper is its use in archaeology and tourism.*

The article describes methods of geovisualization for monitoring spatio-temporal changes on the example of the historic fortress city of Olomouc. The key part of the paper deals with the creation of 3D variant of the historical map and a way of collecting information about buildings using historical documents, which may be plans, maps, technical drawings, etc. Using the three-dimensional map, the user can get a better idea of the spatial parameters of the now non-existing fortress.

Among others, technically simpler methods of geovisualization o spatiotemporal changes belongs geographically localized text labels, an interactive comparison of photographs from various historical periods and an interactive comparison of historical maps and modern aerial images. The visualization of photorealistic 3D models was also tested. All methods use georeferenced data, so the results can be geolocalized, which positively affects the user concept of the historical face of the city. The methods were mutually compared and evaluated in terms of costs and user perception. Currently the evaluation using the system for tracking eyes is in process.

The utilization of the project results can be seen in the tourism sector, where they can be used as a promotion of the city or as a part of on-coming university museum.

Key words: *Olomouc, 3D, Visualization, 3D Map, Google Earth, Eye-Tracking*

INTRODUCTION

The face of the Olomouc city was always shaped by the presence of the army. In 1742, Maria Theresa lost most of Silesia and suddenly Olomouc became a border town. Therefore it was necessary to modernize the fortress. Olomouc was surrounded by a network of massive bastions, ravelins, moats, water-gates, and hearing and bombs corridors and it became one of the strongest bastion fortresses in Europe. In 1758 the fortress resisted the five-weeks-long siege by King Frederick II of Prussia. Olomouc was later rebuilt into a fort fortress. Till this day relatively large number of forts from the 19th century has survived. But only relics of the bastion fortification of the city centre were preserved, because due to the development of the city in the 19th and 20 century the most of walls was demolished. Nowadays, few of the visitors and residents can imagine how massive fortress Olomouc was even 150 years ago.

The aim of the project is the visualization of the in the year 1842. Visualization of historical objects, cities and landscapes are used in many fields of human activity. It can be used in spatial planning, energy, for the removal of environmental burdens, but especially in archaeology and tourism. An example of applications in these areas might be a virtual exploration of the city of Livorno (Carrozino et al., 2009) or large project called Rome Reborn. During the project the city of Rome was completely created in 3D as it was in 320 BC (Guidi et al. 2007).

Both mentioned projects apply increasingly used visualization method, which is the photorealistic 3D model. To create a photorealistic 3D model of the entire Olomouc fortress would be very time consuming and technically demanding. The biggest problem is the lack of source information as a base for the fortification reconstruction. Our project will therefore not intend to create a 3D model of Olomouc. The 3D variant of the historical rapport plan from 1842will be done. As the Haeberling (2005) states, perspective perception of a generalized and symbolized geographic space offers often a better understanding of spatial coherences. Users will be able to get a better idea of how the fortress once looked like. In addition to this 3D maps we use other visualization methods in our project. Those are textual information, a comparison of historical and contemporary photographs, georeferenced historical maps overlaid over current orthophoto. The technique of photorealistic 3D model has only been tested on a few objects because of the lack of appropriate data.

DATA SOURCES

For the processing with the informational content of visualization methods many sources of information and maps have been used. Scientific literature documenting the historical context and descriptions of the fortress objects was used (e.g. Kupka and Kuch – Beburda 2003). The most important source of spatial information has been Rapport plan from the year 1842. It is available in Kriegsarchiv in Vienna and for the purposes of this paper the digital copy of the plan was lent by the MOF's Ltd.

Part of the preparation of the spatio-temporal changes visualization through map and 3D map was cartometric evaluation of Rapport plan. Cartometric evaluation of Rapport plan was done in an environment of the software MapAnalyst. Deformation network, vectors of displacement, contours of rotation and the scale were assessed. Furthermore, general statistics as medium scale plan, standard deviation and RMSE (Root Mean Square Error) were identified. Map sheet was analysed using 158 pairs of control points. The source of modern spatial information was OpenStreetMap.org. A major problem was the lack of control points outside the boundaries of the historic fortification. In the past there were not any objects comparable to today's situation. Most of the control points represent the corners of buildings, rarely river confluences. The city centre didn't suffer significant changes, moreover house numbering is since the fortress era is identical, and so there was no problem with finding pairs of control points. The results are vectors of positional deviations, whose size and angle lead to the mean positional error of the map, which is 3.909 m. The scale of te Rapport plan is approximately 1 : 4 000.

Rapport plan contains a description of the fortress core (alias noyau). There is only floor projection of individual buildings. In determining the approximate height of the buildings knowledge of the preserved buildings height and drawings in the book "Fortress Olomouc" by Kupka and Kuch–Beburda (2003) were used. The last sources of information were historical plans of specific objects. However, they were available for only a few buildings. These plans were lent from National Heritage Institute of the city of Olomouc.

3D MAP

Three-dimensional visualizations are well-established for the presentation of maps or landscape models. Today, the need to present three-dimensional (3D) cartographic content on computer monitors is growing and the possibilities for these presentations are increasing (Buchroithner et al. 2011).

Because the world is the three-dimensional, the perception of 3D information is more natural and therefore, in some cases, more effective than 2D. According to Zebedin et al. (2006), 3D map contains both semantic and geometric description of the captured area and its visualization in 3D environment gives the user a better idea of space, especially height proportions.

In the case of this project, 3D map is considered as a derivation of the above mentioned Rapport plan. Individual fortress objects were modelled in 3D textured using images of historical maps and located exactly at their places on the map. The plastic impression has been reached. Bastions and other buildings pop up out from the map. Users can imagine how the fortress appeared even the 3D map is not a precise representation of the reality.

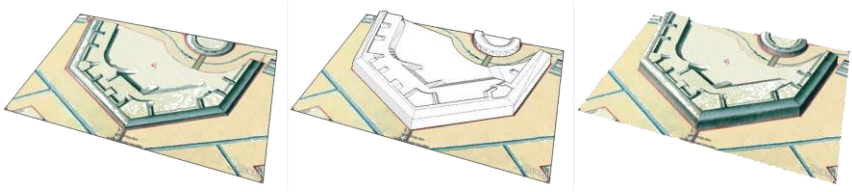


Fig. 1: The procedure of 3D map creation on the basis of the Rapport plan.

3D map of Olomouc bastion fortress was created in the freely available Google SketchUp. With the use of Push/Pull tool of Google SketchUp and few other operations almost any shape can be created. These shapes can then be mapped by any texture. In this particular case, as a texture image Rapport plan was used. This is more natural than using photorealistic textures such as grass, bricks, rocks, etc.

Fig. 2: 3D variant of Rapport plan of Olomouc (1842)

The creation of the 3D map and modelling shapes of the fortress objects very time consuming activity; currently it is prepared only the southern and south-western part of the fortification.

VISUALIZATION METHODS & APLICATION

In the purpose to visualize the spatiotemporal change of the city of Olomouc the application in the GoogleEarth environment were created. Navigation between layers is realized via a tree-structure in the left pane. Here the user can switch on and off the layer that contains the output from individual visualization methods. For example it is possible to simultaneously view and compare historical map images or text. Using animation several flybys of historic fortifications was created, which are also available. The application allows to explore the city changes by several visualization methods including the 3D map.

The most simple method is the depiction of the plain text in „informational bubbles“ for specific part of the fortress. The text is presented via the KML Placemark element, which contains the definition of the geographic location.

Very illustrative is the visualization by comparing historical and current photographs or images of the same place. The old paintings and engravings were created as works of art, or biased, and thus often capture only half-truths. Therefore, when reconstruction of the historic state it is necessary to approach the non-photorealistic works with a caution. For the purpose of this visualization method a simple application were developed using Adobe Flash and Action Script. The application allows interactive comparison of two images. The principle is based on user-controlled opacity changing of contemporary image overloaded on the historical figure.

Cartography is the most important way to transmit and share geographic knowledge. Although map reading requires some experiences with a synthesis of spatial information, the transfer of spatial information from maps is much faster than using text or images (Kubicek and Kozel 2010). Therefore, another method of visualization uses historical maps overlaid over the current orthophoto. Very convenient is the possibility of changing transparency of historical maps, and thus allow comparison with the current situation.

The last method of the visualization is the photorealistic 3D model of fortress objects. The creation of detailed worked out textured 3D model of the whole historical city is the work for many people for a long time. For this reason, just samples of only a few buildings that survived to the present were processed.

EVALUATION

Each visualization methods were evaluated from two aspects, technical and user.

The technical aspect includes, besides the technical and time demands, the difficulty of acquiring the source data and the resulting size of the output (application is available via the Internet). The evaluation of methods in terms of technical processing was done through expert analysis.

The second aspect is the user's perception of the methods. Consequently, it was chosen the Eye-tracking in combination with questionnaire survey.

Eye-tracking is one of the methods of usability studies. Its principle consists in measuring the visible parts of the eye - the pupil, the border of iris and white, or corneal reflection of direct beam of infrared light. The reflected light is recorded by camera. By analysing the changes of light reflection from the cornea the eye movement is calculated. (Glenstrup, 1995)

Information obtained by monitoring eye movements describes the way in which the user explores the image. It can reveal areas of greatest interest, disruptive elements, or a tactic in searching features.

The current results suggest that the most suitable method of visualization is a photorealistic 3D model as it was expected. The second best method was the 3D map, which is illustrative enough and it also allows the user to get an idea of altitude parameters of defences.

FUTURE PLANS

The development of the Olomouc fortress visualization application still goes on. Similarly research on user perception of 2D and 3D maps continues. The next step is to prepare application for the public through Google Maps API and create web pages where the user would find comprehensive information about Olomouc fortress.

The utilization of the project results can be seen in the tourism sector, where they can be used as a promotion of the city or as a part of on-coming university museum.

Acknowledgements: We would like to express our gratitude to MOF's Ltd. and National Heritage Institute of the city of Olomouc for providing the digital copy of Rapport plan and plans of fortification.

REFERENCES

[1] BUCHROITHNER, M. et al. Lenticular Creation of Thematic Multi-Layer-Models. In Proceedings of GeoViz Workshop, Hamburg, Germany, 2011.

[2] CARROZINO, M. et al. The Immersive Time-machine: A virtual exploration of the history of Livorno. In Proceedings of 3D-Arch Conference, Trento, Italy, 2009.

[3] GLENSTRUP, J.A., Eye controlled media: Present and future state, Copenhagen, 1995.

[4] GUIDI, G., FRISCHER, B., LUCENTI, I. Rome Reborn - Virtualizing the ancient imperial Rome. In: Proceedings of the 3D Arch 2007, Trento, Italy, 2007.

[5] HAEBERLING, Ch. Cartographic design principles for 3D maps – A contribution to cartographic theory. In Proceedings of ICA Congress Mapping Approaches into a Changing World, A Coruna, Spain, 2005.

[6] KUBICEK P., KOZEL J. Cartography Techniques for Adaptive Emergency Mapping. In Risk Models and Applications, Berlin, 2010.

[7] KUPKA, V., KUCH-BREBURDA, M. Pevnost Olomouc, Dvůr Králové nad Labem, FORTprint, 2003.

[8] ZEBEDIN, L. et al. Towards 3D map generation from digital aerial images. In ISPRS Journal of Photogrammetry and Remote Sensing, 2006, Volume 60, Issue 6: 413-427.

Tvorba historické 3D mapy zaniklé pevnosti Olomouc

Příspěvek popisuje metody geovizualizace pro sledování časoprostorových změn na příkladu historického pevnostního města Olomouce. Stěžejní část příspěvku se zabývá tvorbou 3D varianty historické mapy a také způsobem získávání informací o stavbách z historických dokumentů. Podle této trojrozměrné mapy si může uživatel udělat lepší prostorovou představu o podobě dnes již neexistující pevnosti. Pomohou mu k tomu i další metody vizualizace, které jsou v příspěvku rovněž popsány a navzájem porovnány.

THE ANALYSIS OF EYE MOVEMENT AS A TOOL FOR EVALUATION OF MAPS AND GRAPHICAL OUTPUTS FROM GIS

Alžběta Brychtová, Stanislav Popelka, Vít Voženílek

Palacký University in Olomouc, Faculty of Science, Department of Geoinformatics

Tř. Svobody 26, Olomouc, 771 46

alzbeta.brychtova@upol.cz, standa.popelka@gmail.com, vit.vozenilek@upol.cz

Abstract: *The paper describes possibilities of utilization the human eye tracking technology to evaluate user perception and cognition of maps and graphic outputs from GIS. Eye-tracking is one of the most precise and objective methods of usability studies. Analyses of eye movements can determine where the monitored person looks, how long are eye fixation on a particular area of the reference image, or what is the user's strategy of the information searching on the map. Based on the analyses results evaluated product (e.g. map) can be optimized so that its reading is more natural and the informational value is height.*

The article depictures different eye-tracking technologies and principles on which they operate. The main attention is paid to methods of processing and visualization of eye movement data obtained by contactless monitoring. The most frequently used methods are GazePlot, which typically evaluates the qualitative characteristics of the observed users behaviour, and HeatMap, used for quantitative evaluation of data obtained by monitoring several users. On the benefit of the cartography it is possible to use the analysis of areas of interest (AOI), where different parts of the map (legend, scale, title, specific phenomena in the map, etc.) are evaluated in terms of the frequency of user fixations. The utilization of eye-tracking outcomes in cartography is demonstrated on concrete examples of evaluated maps.

Key words: *eye-tracking, usability studies, cartography, maps evaluation, perception*

INTRODUCTION

If the map is not the created by professional cartographer, the process of map creation can suffer by considerable degree of subjectivity. Despite the effort of objectification the map creation processes, cartographers can imagine difficulty the way of using the map, its perception, reading, analysis and interpretation.

In addition, cartographers miss arguments for many of their decisions in composing, creating a character key, or cartographic generalization. For these reasons it is necessary to do research on user perception of cartographic products.

There are many approaches for research on user perception and evaluation of the usability and effectiveness of cartographic products. Among hitherto little used the eye-tracking technology belongs. The direction and movement of the monitored person gaze, the way of reading information, or the influence of interfering elements and other aspects of maps perception can be evaluated. The results can be used in the creation of new maps in order to respect the user's requirements.

USABILITY STUDIES

The term usability is defined by ISO 9241-11 (ISO, 1998) as "the effectiveness, efficiency and satisfaction, with which specified users achieve specified goals in particular environments". Nielsen [7] defines usability as a quality attribute that assesses how easy user interfaces are to use.

To be able to derive qualitative or quantitative measures of the user attitudes to product (containing cartographic products), a number of evaluation methods exists: focus group studies, interview, direct observation, think-aloud protocol, screen capturing and eye-tracking. [6]

The last mentioned method, eye-tracking, can be considered an objective method, because recoding eye movements does not rely on self-reporting. It can enhance traditional performance tests, protocol analysis, and walk-through evaluations of a system. [4] The following text is dedicated to the eye-tracking method of cartographic products evaluation.

METHODS OF EYE-TRACKING

The eye-tracking technology is based on the principles of tracking human eye movements while perceiving the visual scene. The measurement device most often used for measuring eye movements is commonly known as eye-tracker. Methods of tracing the human gaze can be divided into three man groups [3]: Electro-Oculo Graphy (EOG, using electrodes placed around the eye), methods using scleral contact lenses and remote (non-invasive).

Most of modern eye-trackers measure the eye position and gaze direction using remote methods. Remote methods rely on the measurement of visible features of eye, e. g. pupil, iris-sclera boundary or corneal reflection of a closely situated direct light source (often infra-red). The reflected light is recorded by a video camera or some other specially designed optical sensor. The information is then analysed to extract eye rotation from changes in reflections.

Under the nature of examined problem it is necessary to use a proper eye-tracker. Individual devices differ from one another by precision given by the spatial resolution and accuracy of the point of view. An important parameter is time resolution, which is expressed in hertz (Hz). Device parameters (resolution, mobility) must respect the purpose of the application for which the device is used.

Eye-trackers of 60 Hz record data approximately every 16 ms. The higher frequency of the device the shorter time between two records naturally is.

BASIC CHARACTERISTICS OF THE EYE MOVEMENT

Eye movement is not smooth. The eye moves in spurts and rests between each movement. The evaluation of eye-tracking data means to identify so called fixations and saccades.

During a fixation the eyes are steadily looking at one spot in the visual scene, which can be understood as an area of interest (AOI). The minimum length of fixation varies. Usually the minimum value for recording a new fixation is a 100 ms.

In order to achieve the most accurate visual impression of a visual scene, the eyes rapidly move in mostly ballistic jumps (i. e., saccades) from one spot to another. Saccades are distinguished by their different length, orientation and direction. [1]

The fixation and saccades identification is basically the statistical description of the observed eye behaviour. Based on the number characteristics of fixations and saccades relationship the relationship of observer to the intended image, the difficulty of information, attention and other parameters of reading are determined.

Raw data generated from an eye-tracking experiment is stored in files containing each subject's gaze coordinates, pupil diameter and user interactions sampled and time stamped according to a sampling frequency of the eye tracker (see Fig. 1).

The main measurements used in eye-tracking research are fixations and saccades (described previously). There are also a multitude of derived metrics that stem from these basic measures, including scanpath measurements. Pupil size and blink rate are also studied.

The number of fixations indicates the effort in searching relevant objects, while the high number of fixation means that the user has to identify many objects before finding the desired aim. [2]

A high number of saccades indicate a low degree of searching efficiency, or inappropriate user interface. User roams from place to place and cannot find a satisfactory answer.

A scanpath describes a complete saccade-fixate-saccade sequence. In a search task, an optimal scan path is viewed as being a straight line to a desired target, with relatively short fixation duration at the target. [4]

A lower blink rate and larger pupils may indicate more cognitive effort. However, these characteristics can be influenced by many other factors, such as light level, so for these reasons, they are less often used in eye-tracking research. [8]

Time	L Raw X [px]	L Raw Y [px]	R Raw X [px]	R Raw Y [px]	L Dia X [px]	L Dia Y [px]	R Dia X [px]	R Dia Y [px]
9679638390	531.82	451.69	758.46	457.57	14.99	14.99	15.99	15.99
9679655026	532.10	451.62	758.47	457.47	15.17	15.17	15.72	15.72
9679671771	532.03	451.52	758.71	457.58	15.5	15.5	15.66	15.66
9679688395	532.22	451.60	758.87	457.45	15.13	15.13	15.92	15.92
9679705018	532.32	451.48	758.96	457.56	15.1	15.1	15.87	15.87
9679721776	532.69	451.61	759.25	457.81	15.22	15.22	15.74	15.74
9679738385	534.28	453.14	760.60	459.37	15.57	15.57	16.8	16.8
9679754998	534.57	453.59	760.88	459.80	15.69	15.69	16.5	16.5
9679771763	534.63	453.63	761.04	459.79	15.65	15.65	16.8	16.8
9679788395	534.56	453.61	761.18	459.73	15.58	15.58	15.89	15.89
9679794187	# Message: UE-mouseclick left x=1451 y=426							

Fig. 1: Example of original data recorded by 60 Hz eye-tracker. The column *Time* indicates the recording time in microseconds. The file also contains coordinates for the left and right eye separately, pupil size, and user interaction.

METHODS OF EYE-TRACKING DATA VISUALIZATION

Visual representations of eye-tracking data analysis is a gripping and fast way to transfer the results of the experiment, from which even people not acquainted with the eye-tracking terminology can make the right conclusions. Visual representations will become increasingly important as the practical applications of eye-tracking expand to commercial areas, where the people expected to participate in the interpretation of the results will be cartographers and programmers rather than eye-tracking researchers. [5]

There are several methods of eye-tracking data visualization. The main means of expression are GazePlot (trajectory of the gaze), GazeReplay (trajectory of the gaze video) and HeatMap (fixation map).

GAZEPLOT AND GAZEREPLAY

GazePlot depicts saccades trajectories, which connect position of fixation, overlapping examined image. GazePlot shows fixations as circles of varying

size (the radius equals to length of fixation) and saccades as lines that connect these circles.

A limitation of this method occurs when displaying large amounts of data. Thanks to the overlapping of fixation is not possible to visually identify their number.

GazeReplay is a dynamic equivalent of GazePlot. The video shows better the user gaze directions, which parts have been noticed earlier or later, and what was the strategy of find out the answer to the question.

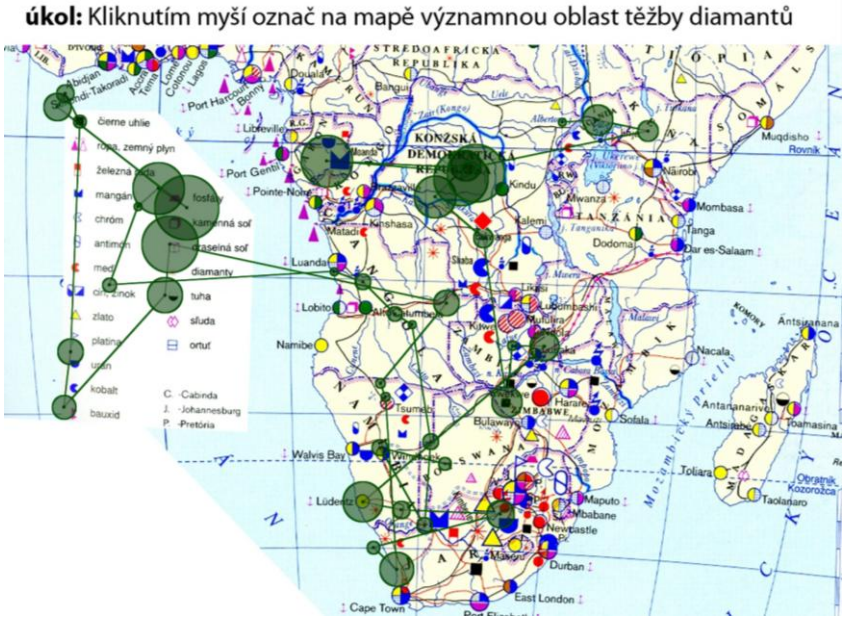


Fig. 2: Preview of the GazePlot of one respondent, who was asked to find locations of diamonds mines on the map. The trajectory of the gaze shows strategy of finding the answer. User thoroughly read the map legend and then visually explored the entire map, before he found the answer. In the place of the correct response the highest density of fixations can be seen.

HEATMAP

HeatMap is a tool to visualize the quantitative characteristics of the user's gaze. It can depict, which part of the image user explores more and, to the contrary, which parts are ignored. HeatMaps are very convenient for a quick overview on which parts of the document users are concentrated on and which should be further analysed.

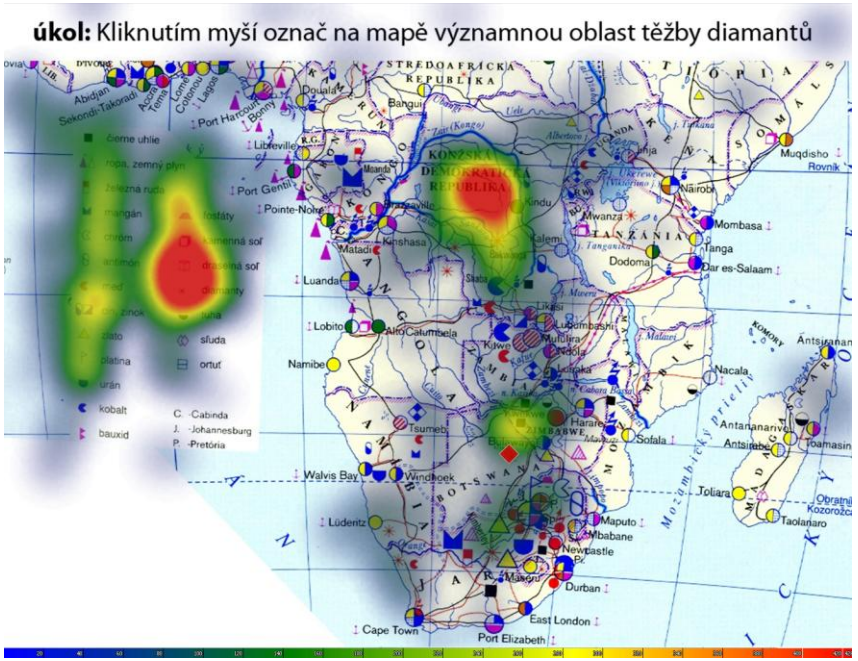


Fig. 3: HeatMap, as a result of eight respondent's records, in this case proves that all users paid most attention to the map legend and place on the map containing the correct answer.

AOI ANALYSIS

In the cartography the analysis of areas of interest (AOI) can be used in advantage. AOI analyses are based on evaluation of concrete parts of the map (legend, scale, title, specific phenomena in the map, etc.) in terms of frequency and order of the user's fixations. AOI analyses provide much better option to find out the exact behaviour of test subjects, than the two previously mentioned methods.

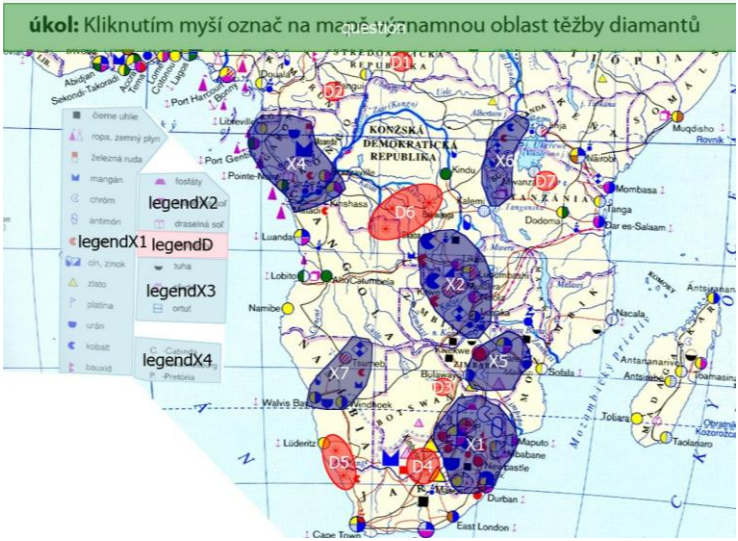


Fig. 4: The initial condition of the AOI analysis is the manual location of areas of interest in the base of the examined map. Pink area (*legendD*) is part of the legend that describes the item related to asked questions (green area *Question*). The wanted area in the map is depicted with red colour (*D1 - D7*). The rest of the map irrelevant to the question is marked with blue, respectively light blue.

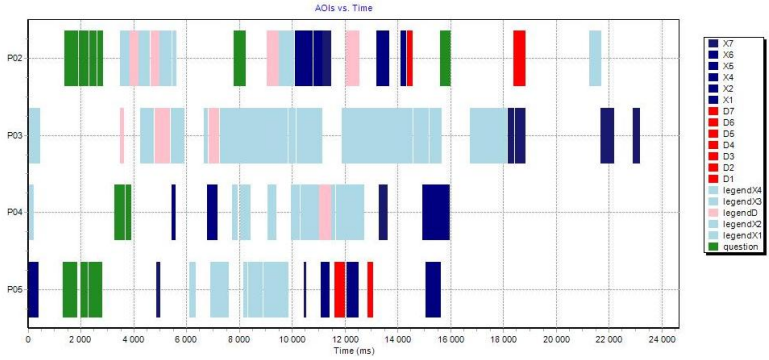


Fig. 5: The so-called sequence chart shows exactly the strategy of several test subjects (*P02 – P06*) of finding answers in the map. The registered fixations in each AOI are visualized depending on the time. Most respondents firstly read the question (green), then explored the legend (light blue and pink) and finally find the correct answer in the map (red).

CONCLUSION

Today the eye-tracking technology is used principally in the fields of evaluation of user perception of websites interface, computer programs, and especially advertising and related commercial matters. Due to the difficult and financially demanding access to facilities monitoring the human eye this technology is still at the beginning in the Cartography, even from a global perspective.

In the coming years we expect a larger and deeper research of various aspects of map reading. Studies evaluating and optimizing the maps composition, legend layout, use of colour, creating characters, placing the description, maps and other content will come. Cartographic research with use of eye-tracking methods will significantly contribute to arguments for a large number of empirically-based rules and guidance of maps and also to the internationalization of the map language.

REFERENCES

[1] BIEDERT, R., BUSCHER, G., DENGEL, A. The EyeBook - Using Eye Tracking to Enhance the Reading Experience. In: Informatik-Spektrum, Vol. 33, Nr. 3, 2010, pp. 272 - 281.

[2] BRODERSEN, L. et al. Applying eye-movement tracking for the study of map perception and map design. Kort und Matrikelstyrelsen, Denmark, Publications Series 4, Vol. 9, 2002, 98 pp.

[3] DUCHOWSKI, A. T. Eye tracking Methodology, Theory and Practice. Springer - Verlag London Limited, 2007, 321 pp.

[4] GOLDBERG, J. H., KOTVAL, X. P. Computer interface evaluation using eye movements: methods and constructs. In International Journal of Industrial Ergonomics, Vol. 24, 1999, pp. 631-645.

[5] IICap – A New Environment for Eye Tracking Data Analysis [on-line]. Lund University Humanities Lab. Accessible via WWW: <http://www.humlab.lu.se/resources/publications/studentpapers/SimonLudvig_01.pdf >. [quot. 11.8.2011].

[6] LI, X., COLTEKIN, A. A., KRAAK, M. J. Visual Exploration of Eye Movement Data Using the Space-Time-Cube. In Geographic Information Science, Lecture Notes in Computer Science, Vol. 6292/2010, 20010, pp. 295-309.

[7] NIELSEN, J. (2003). Usability 101: Introduction to Usability. Alertbox: Current Issues in Web Usability, Accessible via WWW <http://www.useit.com/alertbox/20030825.html>

[8] POOLE, A., LINDEN B. Eye Tracking in Human-Computer Interaction and Usability Research. In Encyclopedia of Human-Computer Interaction. Pennsylvania: Idea Group, Inc., 2005, 13 pp.

Analýza pohybu očí jako nástroj pro hodnocení map a grafických výstupů z GIS

Příspěvek popisuje možnosti využití technologie sledování lidského zraku pro hodnocení uživatelské percepce a kognice map a grafických výstupů z GIS.

V příspěvku jsou popsány technologie sledování zraku a principy, na kterém fungují. Hlavní pozornost je věnována metodám zpracování a vizualizaci dat o pohybu očí získaných bezkontaktním monitoringem. Mezi nejvyužívanější metody patří GazePlot, HeatMapy a analýza oblastí. Využití výstupů eye-trackingu v kartografii je demonstrováno na konkrétních příkladech hodnocených map.

IMPACTS OF CURRICULAR REFORM ON GEOGRAPHIC EDUCATION

CONCEPT OF DEMOGRAPHIC TRANSITION THEORY IN GEOGRAPHICAL CURRICULUM OF PRIMARY AND SECONDARY SCHOOLS IN THE CZECH REPUBLIC.

Jaroslav Vávra

Technická univerzita v Liberci, Fakulta přírodovědně-humanitní a pedagogická, katedra geografie

Studentská 2, 461 17 Liberec

jaroslav.vavra@tul.cz

Abstract: *The Czech geographical curricula (primary and secondary) constitute expected outcomes that they are often obscure and ambiguous. The paper focuses on educational geographical theme 'demographical transition' at Czech primary as well secondary schools. The author uses Bruner's cognitive structure of geographical subject matter and spiral curriculum as well as a Revised Bloom's taxonomy of educational objectives and knowledge of educational psychology.*

Key words: *geographical education, geographical standards, Bloom´s taxonomy*

INTRODUCTION

In the Czech R. the present day geographical teaching goes to following step of curriculum development. The expected geographical outcomes and pedagogical content in examples were the first step. Today there is running the following step in which expected outcomes should be transformed into geographical evaluation standards. They should be setting of criteria for geographical evaluation, for minimum level of students' geographical performance. In May 2011 the first national school-leaving tests were running, and the first national tests for students of 5th and 9th grades will be preparing in 2012.

The Czech pedagogical geography content has been criticised during 1990s and 2000s, because of their descriptiveness, encyclopaedism and unsuitable geographical themes, e.g. industry in each region of the Czech Republic. But Czech geography teachers are not supported by Czech pedagogy. Czech pedagogical scientists deal with pedagogical content and geographical structure of Czech textbooks (Hübelová 2009, Hübelová, Janík 2007, Knecht 2007,

Maňák, Knecht 2007 and others), but fewer their attention is dealt with a selection of geographical content, its instruction of meaning, its appropriateness to students, its spiral curriculum or general competences, I mean values and attitudes that Czech students create and internalize during their studying. These are pedagogic questions which deal with an individual, his/her "inner world" (internalization).

Good example of the Czech situation could be a textbook for the Czech teachers/future teachers *Pedagogika pro učitele* (Pedagogy for Teachers; Vališová, Kasíková, 2011, p. 139). A reader learns about a revision of Bloom's Taxonomy (Anderson, Krathwohl, 2001), but nothing about instruction how to use the taxonomy (see Vávra 2011). The key approach of the authors is to give a lot of categories in pedagogical issues.

In the Czech pedagogical sources the reader learn nothing about an educational psycholgist, David Ausubel (1968) and his advance organizer. Czech pedagogical experts seem not to use original foreign sources. There are exeptions, e.g. pedagogical texts of Finnish pedagogical expert Kansanen (2007) who visited conference on Shulman's pedagogical content in Brno 2007, the Czech R. (Kansanen, 2007; Janík, et al, 2007).

In the text I show some interrelations between geographical education and pure pedagogy on the theme "Demographic Transition Theory". Warren Thomson (1929; in: Morgan, et al., 2005) was the first who published the theory.

THEORETICAL SOLUTION

I concern a relation between geographical and pedagogical content, a relation between rote learning and analysis/creation in learning. I point out to a relationship between generalisation or theory and Ausubel's advanced organizer and I also mention values, attitudes or opinions.

GEOGRAPHICAL AND PEDAGOGICAL CONTENT

"*Content in geography should be subjective and value-oriented and should focus on the conscientious engagement of social problems*" (Buttimer 1974; in: V. Leo Bartlett; in: Fien et al. 1984, p. 70). Shulman (1987) emphasised a concept of knowledge in pedagogical content. The concept was a key theme on the conference in Brno, Czech R. in 2007, I mentioned above. The conclusions of the conference are following:

- knowledge of the field, e.g. geography

- knowledge of education/pedagogy; e.g. classroom management at education of some subject matter
- knowledge of curriculum, subject matter and programmes which support the education;
- knowledge of pedagogical content, which connects proficiency and pedagogy and this is a base of teachers' professionalism;
- knowledge of students and their characteristics;
- knowledge of educational contexts; from knowledge, where student's parents work up to community characteristics and communal culture;
- knowledge of learning objectives, intentions and values.

This is a wider strand than many teachers present. It doesn't only include scientific (e.g. geographical) terms, which is adapted to age development of students, but it is a part of other contexts and components of education. I emphasise the teacher has to relate the content to individual mental development of a student and the content is expressed or should be expressed in a spiral curriculum (e.g. Piaget et al, 2007, Vygotskij, 2004, Rinschede, 2005, and others). Other knowledge of the geography teacher is directed to the taxonomy of educational objectives.

ROTE LEARNING AND/OR ANALYSING/CREATING

Taxonomy of educational objectives is one of the important educational instruments that can be used by teachers. The teachers can use the taxonomy if they suggest educational objectives, their quality, and the teachers may evaluate the attainment targets using the taxonomy (Figure 1).

There is an important instrument for teachers, a Revision of Bloom's Taxonomy (Anderson et al. 2001). I use the two levels – low one and high one (see Figure 1), in two domains – one of the cognitive processes and the other of knowledge. I am sure that realising of the two levels and two domains is useful for Czech geography teachers to push the geography up from rote learning (in cognitive processes) and encyclopaedism (in knowledge domain) to higher levels/quality. Higher quality I mean the educational objectives as values, attitudes, opinions (affective objectives).

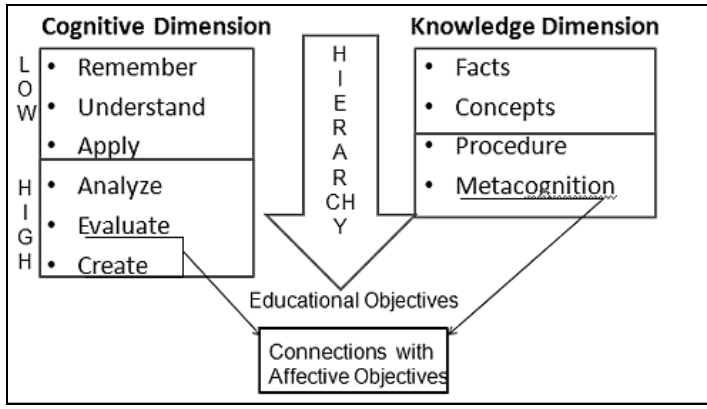


Fig. 1: Two dimensions of A Revision of Bloom's Taxonomy of Educational Objectives (modified)
Source: Anderson, et al., 2001 (modified)

GENERALISATION AND/OR ADVANCE ORGANIZER

Another procedure that is useful for Czech geography teachers is generalisation (Bruner, 1960, 1977). The generalisation is the highest level above facts and terms (concepts). The teacher is realising generalisation, and facts and terms (concepts) support the generalisation. Some students who accept rote learning use more facts and definitions, other students prefer generalisations and use necessary facts and definitions that are needed for contructions of generalisation. Another approach is a way which was suggested by an American educational psychologist, Ausubel (1968). He revised and determed terms that he arranged such a way which are teachable for students. He called the model as the advance organizer (Figure 2). The model is quite different from core curriculum.

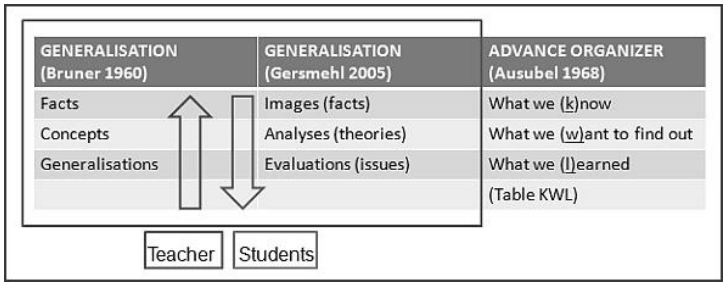


Fig. 2: Generalisation and advance organizer
Source: see References

The teacher using generalisations work (they should work) with facts and terms (definitions, concepts) and a student reach the generalisation via facts and definitions or concepts (see Figure 2). Gersmehl (2005) pushes students further into opinions and value judgement.

Ausubel (1968) prepares or chooses knowledge which is useful for students and puts preferring knowledge to KWL grids and writing frames: What I Know? What I Want to Know? What I Learned?

USING THEORETICAL SOLUTION IN THE THEME „DEMOGRAPHIC TRANSITION THEORY“ IN TEACHING AND LEARNING

Demographic Transition Theory is starting point of generalisation when I start teaching the theme. Advantages of the theory is in teaching and learning: well-arranged structure of concepts (terms, notions) and facts which is presented in a graph; situations in extreme positions; differences between two positions, e.g. natural increase/decrease; changes between positions; transition in students' thinking from concrete to abstract (from facts to generalisation); expansion to the other generalisation, e.g. (neo) Malthusian theory; possibility to differentiate intellectual levels of students (rote learning and analytical/creative learning); spatial patterns, which are projected in countries and cultures differently; using personal student experience; e.g. small/large family; his/her grandparents, parents, brothers/sisters.

The theme is a part of Czech geographical outcome of the (Czech) national curriculum (English official title: Framework Education Programme for Basic Education, p. 61):

- [students] *assess the spatial organisation of the world population, its distribution, structure, growth, migrations as well as growth and migration dynamics on an appropriate level, evaluate on selected examples the mosaic of the multicultural world.*

I must say “an appropriate level” is not standardised even if it is often mentioned in the document. The authors of the document may assume this is a job of Czech teachers.

The theme (Demographic Transition Theory) is part of an outcome in the Czech secondary general education (Grammar Schools). Official title of the curriculum is Framework Education Programme for Secondary General Education (p. 35):

- [students] *evaluate on specific examples the dynamics of population development on the Earth and the geographic, demographic and economic aspects affecting the behaviour, movement, distribution and employment rate of the population.*

It is not clear what examples are specific, how to choose them. It is up to Czech teachers again. But the teachers have not been prepared to do it. Most of them solve the challenge that they teach all countries in the whole world.

What is solution of the issue? Generalisation and give the examples. The based idea is general and simplified line graph of the Demographic Transition and general growth of world population. General column graphs (natality/mortality) and age pyramids are parts of the general line graph in appropriate stages (see Figure 3).

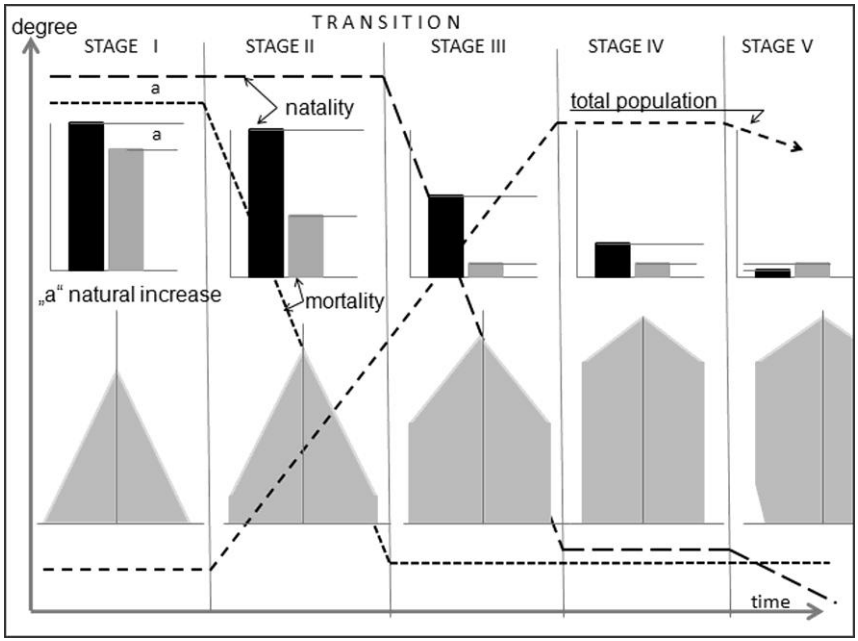


Fig. 3: Demographic Transition, graphs

The classroom management is not only graphs. We use statements as Leat (Leat 1998, p. 22-26) does. Students put the sentences into the general graph. Leat calls the graphs *living graphs* because students are able understand figures in graphs better. Some examples of the sentences (Leat 1998, p. 26):

- Billy White loses his job as a gravedigger
- Parents start to think more about family planning
- A mother sobs over the grave or the last of her six children who died in a typhoid epidemic
- People are encouraged to emigrate to the colonies
- There are more Golden Weddings

There are other options how to teach about population and famine issue in underdeveloped countries. A teacher may find web sites of Xpeditions (National Geographic Society 2008) for 6th and 8th grades.

Students put the column graphs and statements (sentences) into the general graph presented on an interactive whiteboard and other students control and discuss the result/issue.

Following examples (Table 1) show using educational objectives which I determine myself. I use a revision of Bloom's taxonomy (Anderson et al 2001, Vávra 2011) in a simplified form - low and high level, see Figure 1).

Tab. 1: Suggestion of educational objectives of "demographic transition" according to students' age and levels (low/high) of a revision of Bloom´s taxonomy

Level	age 10 and12	age 13 and15	age 16 and18
Low	• identify column graphs of underdeveloped country and of developed country	• use data • construct age pyramid • explain capacity of kindergartens	• use data of time series • construct the graphs • interpret the graphs of countries
High	• set column graphs and sentences into the line graph (separated stages)	• construct graphs of time series • interpret and evaluate changes • predict changes in next 10 years	• evaluate consequences of population politics in China and India • suggest solutions

Source: original

I use the main accent on connection between concrete and abstract, concrete place and larger areas/regions, shift from remember/understand towards higher cognitive and knowledge dimensions (see Table 1). I assume that students apply their personal experience, e.g. family history (number of brothers/sisters in their families) and or use literature, motion pictures and other sources. The suggested teaching and learning pushes to individualization of teaching and learning, and internalization into "inner space" of an individual.

REFERENCES

[1] ANDERSON, L. W.; KRATHWOHL, D. R. A Taxonomy for Learning, Teaching and Assessing. Abridged Edition.: Addison Wesley Longman, Inc., 2001. 302 s. ISBN 0-8013-1903-X

[2] AUSUBEL, D. P. Educational Psychology. A Cognitive View. New York : Holt, Rinehart and Winston, Inc, 1968. 685 s. ISBN 0-03-069640-2.

[3] BARTLETT, V. L. Look into my mind: qualitative inquiry in teaching geography. [book auth.] John Fien, Rodney Gerber and Peter Wilson. The Geography Teacher's Guide to the Classroom. Melbourne : The MacMilan Company of Australia PTY Ltd., 1984, 5, pp. 63-77.

[4] BRUNER, J. The Process of Education. A Landmark in Educational Theory. Twenty-seventh printing, 2003.: Hardvard University Press, 1960, 1977. 97 s. ISBN 0-674-71001-0.

[5] GERSMEHL, P. Teaching Geography. 1th Edition. New York : The Guilford Press, 2005. 278 s. ISBN 1-59385-154-5.

[6] HÜBELOVÁ, D.; JANÍK, T. a NAJVAR, P. Formy a fáze ve výuce zeměpisu: Metodologický postup a vybrané výsledky CPV videostudie zeměpisu. [editor] Tomáš Janík, a další. Příspěvky k tvorbě a výzkumu kurikula. Brno : Paido, 2007, s. 141-156.

[7] INSTUTUTE of EDUCATION. Framework Education Programme for Secondary General Education (Grammer Schools). Prague. [Citation: August 15, 2011] http://old.vuppraha.cz/soubory/RVP_G-anj.pdf

[8] JANÍK, T. Didaktické znaloti obsahu a jejich význam pro oborové didaktiky, tvorbu kurikula a učitelské vzdělávání. Brno: Paido, 2009. 119 s. ISBN 978-80-7315-186-7.

[9] JANÍK, T, a další**.** Pedagogical content knowledge nebo didaktická znalost obsahu? [editor] Lucie Sadílková. Brno : Paido, 2007. 120 s. Sv. 6. ISBN 978-80-7315-139-3.

[10] KANSANEN, P. Oborové didaktiky jako základ znalostní báze pro učitele - nebo tomu budeme raději říkat pedagogical content knowledge? [autor knihy] Tomáš Janík, a další. [editor] Lucie Sadílková. [překl.] Petr Najvar. Pedagogical content knowledge nebo didaktická znalost obsahu? Pedagogický výzkum v teorii a praxi. Brno: Paido, 2007, Sv. 6, 1, s. 11-22.

[11] KNECHT, P. Didaktická transformace aneb od didaktického zjednodušení k didaktické rekonstrukci. Orbis scholae. Roč. 1, č.1, 2007, Sv. Kurikulum v proměnách školy, s. 67-81.

[12] LEAT, D. Thinking Through Geography. 2th Edition 2001. London: Chris Kington Publishing, 1998. 176 s. ISBN 978-1899857-99-9.

[13] MAŇÁK, J. a KNECHT, P. (eds.). 2007. Hodnocení učebnic. Brno: Paido, 2007. 140 s. ISBN 978-80-7315-148-5.

[14] MINISTRY of EDUCATION. Framework Education Programme for Basic Education. Prague. [Citation: August 15, 2011] http://www.msmt.cz/uploads/soubory/zakladni/IM_RVP_ZV_EN_final_rijen08.pdf

[15] MORGAN, J.; LAMBERT, D. Geography: Teaching School Subjects 11-19. Abingdon: Routledge, 2005. 230 s. ISBN 0-415-32111-5.

[16] NATIONAL GEOGRAPHIC SOCIETY. Geography Standards in Your Classroom: Lesson Plans: Addressing World Hunger. Grade Level 6-8, NGS 2008, [Citace: 15. srpen 2011] http://www.nationalgeographic.com/xpeditions/lessons/18/g68/tghunger.html

[17] PIAGET, J.; INHELDEROVÁ, B. Psychologie dítěte. [překl.] Eva Vyskočilová. 4. Praha: Portál, 2007. 145 s. ISBN 978-80-7367-263-8.

[18] RINSCHEDE, G. Geographiedidaktik. 2., aktualisierte Auflage. Paderborn: Verlag Ferdinand Schöningh GmbH, 2005. 515 s. ISBN 3-8252-2324-8.

[19] SHULMAN, L.S. Knowldege and Teaching: Foundations of the New Reform. February 1987, Vol. Vol. 57 No. 1, s. 1-21.

[20] VALIŠOVÁ, A. a KASÍKOVÁ, H., [eds]**.** Pedagogika pro učitele. 2. rozšířené vydání. Praha: Grada Publishing, a.s., 2011. 456 s. ISBN 978-80-247-3357-9.

[21] VÁVRA, J. Proč a k čemu taxonomie vzdělávacích cílů? Metodický portál RVP. [Online] 5. květen 2011. [Citace: 5. květen 2011.] http://clanky.rvp.cz/clanek/c/Z/11113/proc-a-k-cemu-taxonomie-vzdelavacich-cilu-.html/. ISSN 1802-4785.

[22] VYGOTSKIJ, L.S. Psychologie myšlení a řeči. [překl.] Jan Průcha. Praha: Portál, 2004. 135 s. ISBN 80-7178-943-7.

[23] WAUGH, D. Geography. An Integrated Approach. 2nd edition. Walton-on-Thames Surrey: Thomas Nelson & Sons Ltd, 1995. 590 s. ISBN 0-17-444072-3.

Demografický přechod v Rámcových vzdělávacích programech základního a gymnaziálního vzdělávání

V textu hodnotíme teoretická geografická a pedagogická východiska ve vztahu ke konkrétnímu geografickému tématu „teorie demografického přechodu“ ve věkových stupních žáků (cca 10 – 18 let). Důraz klademe na analyzování, hodnocení a zaujímání postojů, tedy k individualizaci geografického vzdělávání. Pokud tuto charakteristiku převedeme do revidované Bloomovy taxonomie vzdělávacích cílů, jde v kognitivní dimenzi o analýzu, hodnocení a tvoření, v dimenzi znalostní o postupy a o metakognice.

Domníváme se, že toto je nutné diskutovat právě v době, kdy začíná odborná diskuse o revizi geografického kurikula a o hodnotících standardech geografického vzdělávání.

ENVIRONMENTAL EDUCATION: EXPANDING PRACTICAL APPLICATIONS - RESEARCH LANDSCAPE OF LITOVELSKÉ POMORAVÍ

Vilém Pechanec[1], Ivo Machar[2], Helena Kilianová[1], Jakub Miřijovský[1]

[1]Palacký University, Faculty of Science, Dept of. Geoinformatics, Tr. Svobody 26, Olomouc, 77146, Czech republic; [2]Palacký University, Faculty of Education, Dept of. Biology, Purkrabská 2, Olomouc, 77146, Czech republic

vilem.pechanec@upol.cz, ivo.machar@upol.cz, helena.kilianova@upol.cz, jakub.mirijovsky@upol.cz

Abstract: *Environmental Education: Expanding Practical Applications represents modern environmental education at Palacký University in Olomouc in 2009-2012. The ENVIrUP project aims to improve the quality of study of biology, ecology subjects and practices at Palacký University in Olomouc in order to improve their application in the relevant discipline and fosters independent and creative thought among students and teaches teamwork and practical skills. Topic of second part is aimed to detect and quantify the landscape changes identified from the aerial photos, to describe quality and structure based on landscape indexes in a given stage and to appoint the main causes of the changes in the landscape development. The aerial photos were visual interpretation and then manual digitized. Created categories of land use were subdued to the landscape analyses. The results of the landscape analyses were interpreted.*

Key words: *education, landscape, analysis,*

THE ENVIRUP PROJECT

Environmental Education: Expanding Practical Applications represents modern environmental education at Palacký University in Olomouc in 2009-2012. Main features are joint project between two faculties and four departments at Palacký University in Olomouc in partnership with the Agency for Nature Conservation and Landscape Protection of the Czech Republic and environmental education centres. The project responds to current issues regarding the search for man's responsible relationship with nature in the area of environmental education. The project offers numerous innovative approaches and is a coherent and systematic plan for making considerable improvements in current practices in this socially significant area.

The ENVIrUP project aims to improve the quality of study of biology, ecology subjects and practices at Palacký University in Olomouc in order to improve their application in the relevant discipline and fosters independent and creative thought among students and teaches teamwork and practical skills. Offers educates teachers at two professional conferences and through teacher exchanges with schools having a similar focus abroad and creates a total of

seven new courses and significantly innovates five existing courses for at least 820 students. As these courses have close ties to one another, students learn to think in broader contexts.

Project supports the creation and printing of entirely new textbooks, learning materials and monographs. Twelve textbooks, publications and a DVD film will be produced and will create an entirely new virtual library of the Litovel Morava River Protected Landscape Area for teachers, students and the public on the professional VIRTUS website.

Also allows secondary school students to learn about individual disciplines, encourages a discussion about their goals and their final personal selection of a field of study at Palacký University and significantly influences the capabilities of teachers (and students) of biology and ecology subjects; the teaching of professional English will help teachers make distinct improvements in their respective fields.

AREA OF INTEREST

The Litovelské Pomoraví Protected Landscape Area (PLA) was established in 1990 on the area of 96 km2. It is located in a 3 – 8 km wide strip of land along the Morava River between the cities of Olomouc and Mohelnice and is composed mainly of floodplain forests and wet meadows habitats. The ancient city of Litovel lies in the heart of the region and gave the area its name. The entire area belongs to the Olomouc County and former districts of Olomouc and Sumperk. The mission of the PLA is to ensure appropriate protection and environmental-friendly uses of the alluvial landscape with exceptional natural values. The core of the PLA and the main natural phenomenon of the area is the ”inland river delta” – naturally meandering course of the Morava River with its branches and tributaries – followed by complexes of floodplain forests, wet alluvial meadows and wetlands. Tresin, a karst area with famous publicly accessible caves, and Doubrava, an area of upland deciduous forests, represent the other two parts of the PLA. Marginal pieces of agricultural land and built up areas are as well included in the PLA in order to even out its border. The aim of the PLA is to maintain this balanced character of cultural landscape in alluvial planes with natural streams, forests and meadows, and to continually improve its ecological functions.

Litovelske Pomoravi has a special position among other protected landscape areas in the Czech Republic. It was one of the last founded PLA and due to its area of 96 km^2 belongs to the smallest ones in the country. However, establishing the Litovelske Pomoravi PLA represented one of the first important steps towards systematic protection of nature in alluvial planes of

large rivers. So far, most of the large-scale protected areas included mountain landscape only

ANALYSIS AND MODELLING LANDSCAPE OF LITOVELSKÉ POMORAVÍ

Materials and methods

Black and white aerial photographs of four time horizons - the period of 1936 to 1938, then from 1953, then again from 1990 and the most up to date photographs came from the year 2001- were used for elaboration of the particular study. All photographs were lent by the Administration of the PLA Litovelské Pomoraví. Aerial photographs from years 1936 – 1938 and from 2001 were supplied in digital form in a scale of 1:5,000, other photographs were in analogue form. All aerial photographs used in this article come from the archive VGHMÚř Dobruška. Particularly for the purposes of rectification the digital vector data ZABAGED were also lent for the area of study. The provider was the Administration of the PLA Litovelské Pomoraví. They were planimetric and vertical data corresponding with the placing of map pages ZM 1:10,000 in the format of ESRI shapefile. Other supportive data were layer files Hranice 84 and Zon 84 which served for demarcation of the area or zones of the PLA. The data were again in the format of ESRI shapefile (see Tab.1).

Tab. 1: Overview of used data

Name	Scale	Type
ZABAGED 1	1: 10000	vector
Hranice 84	1: 10000	vector
Zon 84	1: 10000	vector
Aerial Photographs 2001	1: 5000	grid
Aerial Photographs 1990	1: 5000	grid
Aerial Photographs 1953	1: 5000	grid
Aerial Photographs 1936-38	1: 5000	grid

Source: own elaboration (orig.)

The first step involved the transfer of analogue pictures into digital form. Specifically it meant scanning of pictures from two time horizons, i.e. from the year 1953 and 1990. The photographs were scanned on the big format scanner Cougar Tx36. The resolution was set to 150 dpi. This process was followed by rectification of scanned pictures with the help of ArcGIS. Rectification is a common process of transformation of the location of all picture units from one system of coordinates into another. Reference data ZABAGED - planimetry were used for rectification corresponding with the placing of map pages ZM 1:10,000 for the area of study which were supplied by the Administration of

the PLA Litovelské Pomoraví. Photographs from years 1936 – 1938 and 2001 were supplied in a rectified format.

The next step was an on-screen vectorization of objects on rectified photographs in the environment of the programme ArcGIS. This procedure was thanks to the large size of the studied area very time consuming – the vectorization took approximately 800 hours of work. After the vectorization was finished topical maps of land use from the period of 1936 – 1938, 1953, 1990 and 2001 were created which represent secondary landscape structure. With the help of the XTools extension all extends in hectares and other parameters were calculated for all categories which were necessary for following analytic research.

Analyses

After the pre-elaboration of data all photographs were in unified coordinate system. The area was classified into 7 land use categories for particular years (woodland, orchards, permanent grassland, arable land, roads, water bodies and anthropogenic activity). Visual classification method was used for landscape assessment. For polygon vector layers were the result of classification for particular years out of which further desired landscape characteristics were assessed. The category of water bodies was only marked in the vector layer from the year 2000 and was not possible to recognize on photographs from any other years, therefore it was not included in further multitemporal analyses.
Then the extent and perimeter of the polygons and the length of lines in particular layers was calculated. Data were merged according to the categories and the overall extent of particular categories in particular years was gained. Four tables of relative representation of particular land use categories were created, one for each year. Each table contained the overall extend of the category in hectares and relative representation in percents. Lastly the analysis of areas stability was carried out when there were segments separated out of the vector polygon layers which showed the area from the land use point of view stable in certain period of time, i.e. the category LULC was the same for the entire time period in the particular area. Next analysis are focus to some landscape – ecological analyses, prediction of landuse by using modules MARKOV and CA_MARKOV and evaluation of landscape potential.

RESULTS

Changes in land use in the time period of 1936–2001.

It is possible to detect typical characteristics of Czech rural landscape in the photographs from the oldest period of time which has been gradually formed

since18th century. There are mainly standards or linear communities alongside roads. In the materials from 1990 it is, on the other hand, evident how the centrally managed economics based on socialistic system influenced the landscape character. Apart from plot merging and baulk ploughing there were also field draining and water stream regulation. The foundation of the PLA in 1990 and an appropriately chosen management of the Administration of the PLA executed in conformity with the relevant Management Plan of the PLA were of a definite beneficial influence over the structure of actual landscape mosaic without any doubt. The identified changes of land use within the area of the PLA Litovelské Pomoraví from the time period of 1936 – 2001 are shown in Tab.2.

Tab. 2: Changes in land use within the area of the PLA Litovelské Pomoraví in the time period of 1936–2001

Category	Area (ha) in 1936-38	Area (ha) in 2001	Change of area (%)
Woodland	4,504.622	4,721.208	4.81
Shrubs	622.257	450.297	-27.63
Meadows and pastures	1,377.525	695.418	-49.52
Scattered vegetation	396.265	455.46	14.94
Arable land	1,743.002	1,983.054	13.77
Gardens and allotments	170.082	247.405	45.46
Forest and field roads	189.935	172.542	-9.16
Communications	76.388	107.095	40.20
Other hard surface	3.506	18.963	440.87
Buildings	45.447	77.988	71.60
Streams	191.518	196.124	2.40
Water bodies	20.233	220.639	990.49

Source: own elaboration (original)

Number and average size of segments

The number of segments is determined by the overall number of entities forming the particular category. Entities are homogenous areas that are not possible to divide spacewise any further and which form a mosaic of the particular category of land use. Only those categories were chosen for the analysis that were possible to divide into segments, therefore water and linear elements were omitted.

Overall it is possible to state that within the time period of 1936 – 2001the number of anthropogenic modified areas (for example "other hard surface", "gardens and allotments") was growing at the expense of shrubs, meadows and pastures. The overall diversity of landscape was decreasing - from 15,265 segments in 1936 to 13,278 segments in 2001.

The average size of segments is a simple characteristic showing together with the number of segments the articulation of landscape. Much like the previous analysis the categories that are not possible to divide into individual segments have been omitted.

The largest average size of polygons is presented in categories of woodland and arable land, the smallest then in the category of buildings. The average size of segments has been growing since 1953 – the average size of all categories was 0.692 ha in 1953 and 1.011 ha in 2001 (see Tab.3)

Tab. 3: Average size of segments in individual categories in the time period of 1936–2001

Average size of segments (ha)				
Categories	1936-38	1953	1990	2001
Woodland	2.53	2.58	2.15	2.08
Shrubs	0.51	0.31	0.34	0.31
Meadows and pastures	1.8	1.85	1.15	1.1
Scattered vegetation	0.12	0.15	0.19	0.24
Arable land	0.3	0.32	4.5	4.02
Gardens and allotments	0.19	0.19	0.16	0.16
Buildings	0.05	0.05	0.04	0.04
Other hard surface	0.08	0.08	0.14	0.14

Source: own elaboration (original)

CONCLUSION

The gained results clearly show both quantitative and qualitative changes in landscape. Data of RS are valuable sources of information for evaluating the changes in landscape where these can be used mainly as a supporting instrument for inventory and establishment of current status of the objects of interest. Thanks to the time series it is possible to follow development changes. With the help of landscape-ecological indices it is possible to describe the state

and structure of the landscape within the time period under consideration as well as the development of the landscape in time.

REFERENCES

[1] BOREK, J. Analýza vývoje krajinné struktury na území CHKO Litovelské Pomoraví. [Diplomová práce]. Olomouc: Katedra geoinformatiky, PřF, Univerzita Palackého v Olomouci, 2007. 75p.

[2] LILLESAND, T. M., KIEFFER, R. W. Remote sensing and image interpretation. New York, Chichester, Brisbane, Toronto, Singapure: John Wiley & Sons, 1995. 750 p. ISBN 0-471-45152-5

[3] PECHANEC, V. Analyses of evolution of floodplain forests landscape structure. In. Machar I. (ed): Biodiversity and target management of floodplain forests in the Morava river basin. Universita Palackého v Olomouci: 2010. 30-39 s. ISBN: 978-80-244-2530-6

Enviromentální vzdělávání pro praxi na UP – výzkum krajiny Litovelského Pomoraví

Cílem projektu ENVIrUP je zvýšit vzdělanostní úroveň a zvláště praktické dovednosti VŠ studentů – budoucích pedagogů, pracovníků státní správy a dalších institucí v ochraně přírody a environmentální výchově. V rámci projektu jsou vytvořeny nové a inovované stávající kurzy, vydány vzdělávací materiály, realizovány odborné stáže u budoucích zaměstnavatelů, vzděláváni pracovníci univerzity v oblasti jazyků a odborných kompetencí, realizováno poradenství pro uchazeče o studium na VŠ. Projekt je realizován týmem pracovníků pedagogické a přírodovědecké fakulty UP ve spolupráci s Agenturou ochrany přírody a krajiny ČR. Cílem provedených analýz bylo na základě leteckých snímků a dalších dostupných materiálů identifikovat a vyhodnotit změny v krajině na území CHKO Litovelské Pomoraví. Letecké snímky byly vektorizovány metodou vizuální interpretace. Vytvořené kategorie byly dále zpracovány pomocí krajinných analýz, Výstupy jsou v podobě podrobných map území charakterizujících vývoj krajiny v jednotlivých časových horizontech a také soubor tabulek a grafů, jež vyjadřují rozdíly mezi jednotlivými kategoriemi ve zvolených časových horizontech.

THE MODERN WAY OF TEACHING CARTOGRAPHY

Ilona Kašpárková, Darina Mísařová

Masaryk University, Faculty of Education

Poříčí 7, 603 00 Brno

E-mail: foltynova@ped.muni.cz, 322518@mail.muni.cz

Abstract: *Paper presents possibilities of using lenticular maps for teaching geography at elementary schools. Using quantitative research methods enables to compare classic tourist maps and lenticular maps, which in addition to standard elements of drawn maps can also display the depth. 159 students of the sixth grade participated in the research. The research results are interpreted in graphical and numerical form, discussed and commented.*

Key words: *teaching cartography, teaching tool, lenticular maps*

INTRODUCTION

Rapid development of advanced information technologies in recent years forces teachers to use more advanced technologies and practices in teaching. Modern technologies, whether we seem complicated, often display easily and graphically display complex facts, involve more pupils' imagination and raise our own level of education.

We decided to carry out our research in geography teaching and to compare the teaching using standard cartographic tool which is a tourist map printed on paper (even though that is not often used in teaching at all) with the teaching using a map printed with lenticular printing technology. We tried to determine whether or not this technology is beneficial to teaching and what responses do pupils working with this kind of map meet. The actual responses of students are often the best criterion for verifying whether or not the map is useful and its use improves the teaching.

TEACHING AIDS USED IN CARTOGRAPHY

Let's introduce an overview of currently used teaching aids used in teaching cartography at elementary schools. Selected teaching materials were divided according to content and form.

Types of teaching aids by the content:

- Topographic maps. A topographic map is a medium scale map that easily displays cartographic objects and using their generalization allows suitable overall orientation on a given territory. It also describes details of the morphology of the relief [3].
- Thematic maps. Thematic maps display socio-economic, technical or natural objects and their mutual relations on the background of topographic map, reduced topographic map or general geographical map. With their help the specific information about the location can be entered in the map and it allows their much larger use [3].
- Geographical maps. Geographical map is a small scale map representing features in larger geographical areas. It is characterized by a high level of generalization of physical-geographical and socio-economic features. This map type is mainly used along with thematic maps in atlases, [3].That is the reason why geographical maps are suitable candidate for lenticular printing.

Types of teaching aids by the form:

It seems appropriate to divide teaching aids by the reality oriented form. In this case we consider analog or digital maps.

a) Analog teaching aids:

- maps and map series (atlases)
- plastic maps
- globe
- photo maps
- anaglyf maps

b) Digital teaching aids:

- digital maps
- GIS software
- aplications as Google Earth and NASA World Wind

Due to the limited length of individual contributions we will not further define individual aids.

DEFEINITION OF BASIC TERMS

The definition by the Czech norm ČSN 73 0401 shows that the map is a generalized, scaled down and conventional image of Earth, celestial bodies, or parts of the cosmos, transferred to a plane by defined mathematical relationships (cartographic projections) showing by selected aspects the location, status and relationships of natural, socioeconomic and technical objects and processes [1]. We could also freely say that this is a generalized depiction of objects, located on the earth's surface (or on the surface of other celestial bodies).

Maps can be classified according to the form or the medium on which the map is created [3] into the following categories:

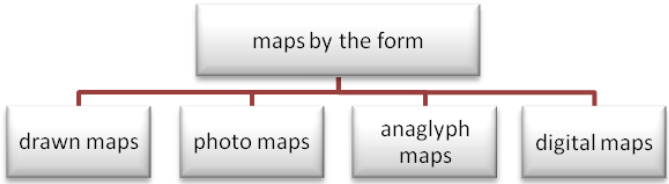


Fig. 1: A diagram describing maps classification by the form

Lenticular map is a topographic map, thematic or geographical map created by the lenticular printing technology. Compared to photo maps and drawn maps lenticular maps have the ability to show the third dimension (the morphology of the relief).

As mentioned earlier by the form you can include lenticular map among anaglyph maps. This statement is not entirely accurate because lenticular map uses compared to anaglyph map different display technology. Figure 2 illustrates the difference between anaglyph and lenticular technology.

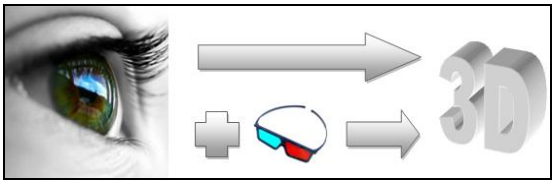


Fig. 2: Comparison of lenticular (top) and anaglyph (bottom) displaying

Anaglyph technology needs special glasses with colored lenses that polarize the image and creates an illusion of depth to display a depth of the image (3D). Lenticular technology does not need such technical aid and an illusion of depth we get directly by looking at a specially modified map. Both of these methods

belong to stereoscopic display. It should be wiser to reformulate the previous classification by the form as shown in the figure 3.

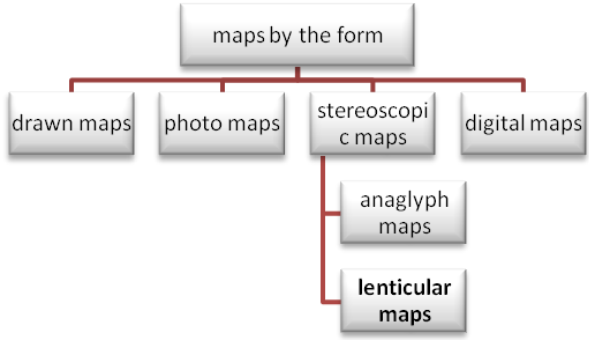


Fig. 3: The modified diagram describing the classification of maps by the form

Lenticular map

Lenticular map is created using lenticular printing technology. By its nature it belongs among stereoscopic, respectively auto-stereoscopic methods that allow you to add a depth perception to regular 2D map base. The basic element of the lenticular lens technology that allows perceiving images depth. In addition to the lenticular lens attributes it can be used to display moving or other images gathered on one sheet of paper. The beginning of lenticular printing dates back to 1940 when it was used for the first time to display moving patterns. With the above mentioned properties lenticular printing is frequently used and due to the opportunity to display the depth of the image it is a suitable tool for topographic maps creation [4].

Lenticular lenses

Lenticular lenses are usually manufactured as a complex of cylindrical lenses made of plastic material. Lenticular lenses are magnifying lenses displaying a different image depth in different angles thanks to the different refraction of light on the cylindrical surface of the lens (Fig. 4). Sketch of cross section shows that if we look through specific part of the lenticular lens we will see only that each layer corresponding to the depth (right eye focuses to a different place than left eye).

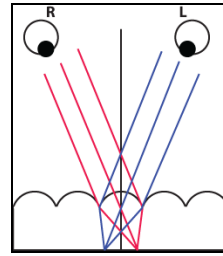


Fig. 4: Depth perception of right and left eye with lenticular lens
Source: www.vicgi.com

RESEARCH

The aim of the research was to evaluate the usefulness of lenticular maps in teaching geography at elementary schools. We tried to find out how the form of map affects the student's ability to describe the morphology of the relief in specific area.

The research sample consisted of pupils of the 6th grade of elementary schools in the district of Žďár nad Sázavou in the Vysočina Region. A total of 159 respondents of the survey were represented by seven classes. The 6th grade seemed appropriate for the research because the topic dealing with cartography is being discussed at the beginning of this grade.

A questionnaire was used as a research tool. It was designed as a worksheet for students. One group of 83 respondents received a lenticular maps (showing only a layer of contours and elevation points and made by Kartografie Company). These maps included transparent layer with marked points (Fig. 5) Second group including 76 respondents used a tourist map (made by SHOCart Company).

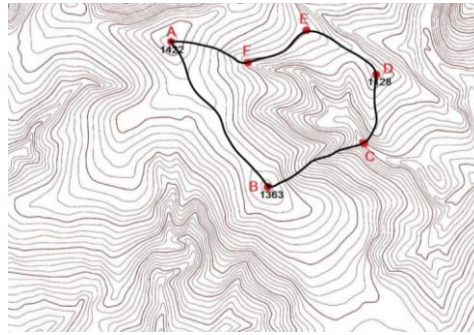


Fig. 5: Lenticular form of topographic map for worksheet

These marked points were linked to following questions:

1. a) The highest track point is hidden under the letter ... with an altitude of ... meters.

This question can verify illustration of lenticular maps compared to conventional tourist maps. Transparent layer of lenticular map includes numbers of elevation points while information in tourist maps coincide with a number of other thematic information such as hiking trails, bike paths, etc. Lenticular map thanks to the extra depth allows you to distinguish areas with different altitude.

1. b) The lowest track point lies in point ... with an altitude of ... meters.

Similar to question 1a). The difference is that the lowest point is not directly specified by altitude. The respondent must calculate it from the contour distance.

2. Write down the points which you are going uphill, downhill or on the flat surface.

Respondents answers this question to selected slopes listed under the question.

3. What is the steepest slope? Circle the option.

Respondents choose one of slopes. Using lenticular map could bring a certain advantage.

4. What is the mildest slope? Circle the correct option.

The same as question 3.

5. Try to calculate the distance between contours, named contour distance ...

This question requires the respondents to determine the contour distance. You need to subtract two known values of altitude at two specific points and count the number of contours between them. The share of altitude difference of two selected points and the number of contours between these points is then wanted contour distance.

In the second part of the questionnaire were given additional questions concerning the subjective feelings of students at work with a map. They shall bring information about the advantages and disadvantages of lenticular and tourist maps directly from users-students. Questions were considered as follows:

1. The questions seemed to me: easy x moderate x difficult x I do not know / I cannot decide

2. Questions were given: comprehensibly x entirely incomprehensibly x I do not know / I cannot decide x some question incomprehensibly / name ...
3. Work with the map: good x bad x I do not know / I cannot decide
4. Problems with answering questions: none x some have occurred x I do not know / I cannot decide
5. How was the work with attached map? good / bad and why? (the situation in map is/is not clear etc.)

RESEARCH RESULTS

The accuracy of responses from the worksheet is documented in the following chart.

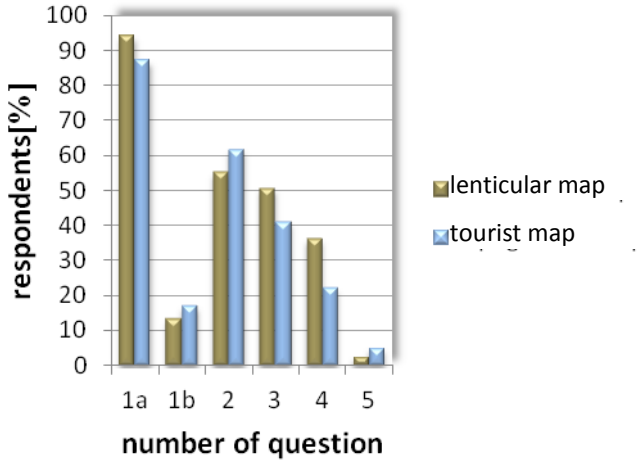


Fig. 6: The bar graph comparing the responses of respondents using lenticular and tourist map

High accuracy of answers for question 1a) can be attributed to the fact that the highest peak is the specific value of the altitude marked directly in the map. In contrast questions 1b) where the value was not explicitly stated the percentage of correct answers is very small. This primarily relates to question No. 5. Its result formed the potential for the correct answer to question 1b). The advantages of lenticular maps compared to tourist map asked for question 1 has not been demonstrated. Particularly in question 1b) it was assumed that the spatial perception of lenticular maps favors their respondents. Results can help

to understand that respondents considered the lowest numerically indicated value in the map as the lowest value of altitude. Questions 1a,b did not prove significant difference between different forms of map. This can be attributed to an explicit expression of altitude (question 1a) and the inability to calculate the lowest elevation using contour distances (question 1b). Question No. 2 can point out the higher rate of correct answers among the respondents using the topographic map. For respondents using lenticular map a lower percentage of correct answers can be attributed to wrong answers instead of inadequate maps. Respondents using lenticular map were successful at question No. 3. This can be attributed to the increased clarity given to lenticular map by depth perception. In the same way it was possible to use lenticular map for preparation of question No 4. Visual perception was similarly advantage as in the case of the last question compared to conventional projected topographic map. Question No 5 pointed out incorrect responses prevailing in both variants. But we can state that quantifying the number of contours is much more difficult for lenticular map than for ordinary two dimensional topographic map.

The results of the second supplementary questions related to respondents' subjective feelings summarize only the responses of students to lenticular map (Tab. 1).

Tab. 1: Open answers to the question No 5: „ Was the work with enclosed map better than with paper map? (literal citation)

YES	NO
It is clearer, the normal map is not so clear.	My eyes hurt. I can see only appearance of flash lights!
Yes, peaks and depressions can be seen.	It is not very clear.
Yes, the work is better.	No, map glistened.
It is certainly better than paper map because it is 3D.	Worse. The classic map is better for the work with contours.
It is arranged like a 3D.	No, it hurt my eyes. It is not clear.
Yes, because it is 3D and it was easier to observe the hills.	No, enclosed map is worse than paper one.
Yes, because it looked like hills. They were protruded as in reality.	No, it is something different than we're used to.
It is clear because you can see the surface.	No, because it hurts my eyes and everything is not quite significant.
Yes, it is clearer. Because when you look at it, you can see where the depressions are located.	No, because it is confusing.
It is easier because it's rigid.	No, because it is confusing and I do not understand it.
Yes, because a paper map is larger and it is difficult to work with.	No, because it is three dimensional and it confuses.
	No, it is not clear.

Yes, you can see what is uphill and downhill. The map is pretty clear. It is clearer and it is easy to identify hills and lowlands. It's like 3D technology. It is better to observe flat surface or hill. A map was very clear. You can easily distinguish altitude, hills, etc. Yes, I was able to recognize altitude and easily understandable contours. The work with the map was quite well, hills are easy to observe. Yes, it was interesting and rigid. Yes, it can be, even though it was difficult.	No, a paper map is clearer. No, I felt dizzy. No, because when I moved it somehow, points moved a little bit too. No, because it seemed very blurry and disorganized. No, because it shines. No, my eyes hurt. I think that it is not clear. I could not focus on it. It is not clear and it hurt my eyes. No, this map was for me less clear.

A complete description of the research and all results are reported by the author in the bachelor work [2].

CONSLUSION

It is quite clear that the introduction of a new type of technological processing of the map will not cause a revolution in education, but it can be one of many small steps improving the education of younger generations.

Lenticular form of map providing depth perception significantly contributes to the intuitive understanding of the relief morphology. Lenticular map is an illustrative aid but due to lenticular printing technology it is not suitable for more complex thematic maps with more generalized information. Using larger amounts of data on lenticular map causes distortion of spatial perception and the result is usually unclear and blurred map. Lenticular map is therefore particularly suitable for representing relief morphology on maps with a high level of generalization.

The main advantage of lenticular map is that it allows due to the perception of depth to understand the morphology of the relief in the area. We consider that the main weaknesses associated with the use of lenticular maps are that these maps are not suitable to display features at reduced scales. Therefore it is suitable for larger scale maps with a higher level of generalization (higher number of objects causes blur of depth perception).

REFERENCES

[1] ČSN 73 0401. Názvosloví v geodézii a kartografii. Praha: ÚNMZ, 1990-09-01.

[2] KAŠPÁRKOVÁ, I. Využití lentikulárních map ve výuce zeměpisu na ZŠ. Brno, 2011. Diplomová práce. Masarykova univerzita, Pedagogická fakulta.

[3] KONEČNÝ, M., KAPLAN V. Multimediální učebnice kartografie a geoinformatiky [online]. PřF MU Brno: 2005. URL: <http://147.251.65.2/ucebnice/kartografie/index.php> [cit. 2011-03-02].

[4] Lenticular printing [online]. URL:<http://en.wikipedia.org/wiki/Lenticular_printing> [cit. 2011-03-21].

[5] Lenticular lens [online]. URL: <http://en.wikipedia.org/wiki/Lenticular_lens> [cit. 2011-03-21].

Moderní způsoby výuky kartografie

Pro výuku zeměpisu, resp. kartografie na základních školách lze považovat využití lentikulárních map jako výhodné zejména v raném stádiu výuky. Pomocí lentikulárních map lze ilustrovat význam některých důležitých atributů mapy, jakými jsou například vrstevnice. Pro žáky bude vnesení moderní učební pomůcky důvodem ke zvýšenému zájmu, který může mít za následek lepší pochopení probíraného učiva. Tento psychologický vliv nelze podceňovat a v kombinaci s vysokou názorností bude pro výuku jistě lentikulární mapa přínosem.

THE LEVEL OF MAP SKILLS DEVELOPMENT OF ELEMENTARY SCHOOL PUPILS

Kateřina Mrázková, Eduard Hofmann

Department of Geography, Faculty of Education, Masaryk University

Poříčí 7, Brno 603 00

mrazkova@mail.muni.cz, hofmann@ped.muni.cz

Abstract: *Maps belongs to the most useful aids in geography teaching. They enable teachers to show distant and unknown places on the earth. But, maps are not used only to finding rivers, cities or states. First of all, maps are the worth source of information. To pupils could find out or take out the information from the map, they must develop their map skills - map reading, map analysing and map interpretation.*

The paper presents the results of pretest focused on the level of development of map skills by pupils attending basic school. Geographical framework was used as a reserch tool. It consists of geographical tasks focused on the map skills. Separate tasks goes along with the map skills presented in the Map Skills Model. The results show the significant influence of the grade. The influence of the gender was not proved.

Key words: *Gender, Geographical framework, Grade, Maps, Map skills.*

INTRODUCTION

Maps and globes belong to the most popular aids in geography teaching (Bednarz, 2004; Wiegand, 2006). They enable teachers to show geographical objects like faraway places, lost civilizations or cities. These aids can be used to complete the information from geographical text. If the map is created according to the cartographical rules (see e.g. Pravda, 2003; Wiegand, 2004) and if it is used in an appropriate way in geography teaching, it can support learning and it also helps students to find some important and meaningful information. The present growth of number of maps on internet, digital atlases and geographical information systems shows that it is necessary to learn new skills addition to traditional ones. These skills enable people to use map and work with map. They are called map skills.

Although the term map skills appeared most often in nowadays, due to the increasing number of maps, we do not have the definition of this term in the Czech didactic of geography. As we explained in our previous work (see Mrázková, 2010, p. 54), map skills include all tasks connected with maps, such as working with map key, finding/looking up of particular place on map, map orientation, the work with two or more different maps of the same place, discovering spatial relations between places and answering geographical questions and tasks. Kimerling explains the term map skills as the use of maps: "Use of map is a process of acquisition of useful information from one or more maps to they help us understand our environment and improve own mental mapping" (Kimerling et al., 2009, p. 10). Wiegand (1998, p.19) suggests three possible meanings of the term map skills: (1) to find out where places are in relation to each other, (2) to use map to find the way, (3) to use map to solve problems. Each of these three uses of maps implies different yet interrelated skills.

We can find many other definition or explanations of map skills term. But it was necessary to establish own definition which would be suitable for Czech geographic education and which will reflect the aims for geography as school subject, established in the Framework Educational Programme for Basic Education (RVP ZV, 2007). The result of our analysis and synthesis is the Map Skills Model (see picture 1).

The Map Skills Model is based on the map skills as were defined in the Dutch researches (in details see e.g. Van der Schee, 1987, Van der Zijpp, 1996; van Dijk, 1998).

BACKGROUND

The understanding that map can show the real world in smaller scale is the basic presumtion for map undestanding (Glück, 2001). Secondly, we should also see the relation between map and the real world (or dispalyed area) (Presson, 1982). Related studies can be grouped into the two groups. The first domain deals with the development of spatial cognition. Such studies were firstly conducted by Piaget and Inhelder (1971). They made the first research about the development of spatial concepts in children. Their results show three stadiums of spatial cogniton related to the age: topological (children age 2 to 7), projective (children age 7 to 11) and euclidean (children age 11 to 15). Another domain concerns the influence of different variables on development of map skills. Boardman (1989) examined the differences in level line readnig among the pupils age 11 to 14. Pupils were asekd to shade all land above a certain height on a scketch map. The results show that only 36 % of the 11 aged pupil and 75 % of the 14 aged pupils correctly shaded a map. Postigo and Pozo (2004) used map as a visual material (as well as graphs or pictures). In their research they examined the differences it the amount of information extracted from the map related to the age of participants. The older students were able to extract more information than the younger. Simillar results show also Wigglesworth (2003). His researched was focused on the ability to find the way from point A to the point B and to describe in detail. The results show that the older students described the way in more detail than the younger. Gilmartin and Patton (1984) focused on the influence of gender on the development of map skills. The results did not show the significant difference although the girls performed better. However, these results are in opposite to the other researches. Riding and Boardman (1983) as well as Coventry and Mathews (1984) proved that boys performed significantly better in map reading, level line reading and in tasks focused on the spatial relationships.

AIM AND DESIGN OF THE PRETEST

The aim of the pretest research was to investigate the level of development of map skills by pupils attending primary school. We assumed that pupils would perform better in map reading than in map analysing and map interpretation. We also assumed that boys would perform better than girls in the level of development of map skills in general as well as in three defined map sub-skills

(map reading, map analysis and map interpretation). We expected to find an increase in pupils' scores when their grade increases.

Participants

The sample consist of 79 lower secondary school pupils attending two Czech elementary schools. The participants were from 11 to 15 years old. Seventeen pupils were from 6th grade, 37 pupils from 7th grade and 25 from 9th grade. The sample consists of 43 males and 36 females.

Research tool

The geographical framework of the test consists of 20 map tasks: eleven to test pupils' level of development of pupils' map reading skill, five to test the level of development of map analysis skill and four to test the level of development of map interpretation skill. Professional geography teachers were asked to validate the tasks in test.

RESULTS OF THE PRETEST

The reliability of the geographical framework was calculated using Cronbach's alpha coefficient. The value of reliability was high ($\alpha = 0.77$), which indicated acceptable reliability of the geographical framework (Nunnaly 1978). The high value of reliability coefficient in our study implies that the instrument used for investigation of pupils' development of map skills is reliable and its usage for further analysis is appropriate.

Analysis of Variance (ANOVA) with general results for geographical framework and partial results for each map skill as dependent variables and demographic variables (gender and grade) as independent variables were conduted. We used Fisher LSD post - hoc test to get more detailed results.

The level of development of map skills

There was no significant difference found between boys and girls ($F = 2,3915$; $p > 0,01$). Girls achieved a slightly higher score. A statistically significant difference was found among grades ($F = 19,39$; $p < 0,001$). The 6th grade pupils had the lowest average, whereas the 9th grade pupils were highest.

The development of map reading skills

Map reading is the basis for the map skills. It deals with the level line reading, working with map key and finding way (see the picture 1). There was no significant difference found between boys and girls ($F = 1,80$; $p = 0,18$). A statistically significant difference was found among grades ($F = 9,79$; $p < 0,001$), the 9th grade had the highest results.

The level of development of map analysis skills

Map analysis tasks were focused on spatial relationships, areal differentation and spatial distribution among the phenomenon on the map. There was no significant difference found between boys and girls. But there was a statistically significant defference among grades ($F = 17,37$; $p < 0,001$). The 9th grade pupils achieved the highest score.

The level of development of map interpretation skills

Map interpretation is the most complex skill. It is necessary to have some geographical knowledge to be able to answer the question. There was found the significant difference between boys and girls ($F = 3,90$; $p < 0,05$). Girls were significantly better than boys. There was a statistically significant defference among grades ($F = 6,33$; $p < 0,01$), the 9th grade achieved the highest result.

CONCLUSSION

The pretest was focused on the level of development of map skills among the pupils of second grade of elementary school. We used gender and grade as two main independent variables. The results show that there is statistically significant difference in results related to the grade. Our results are in the compliance with the results of previous researches (Piaget, & Inhelder, 1971, Postigo, & Pozo, 2004).

On the other hand, there was found almost no significant difference in the level of development of map skills related to the gender. In contrast to Coventry and Mathews (1984) our results did not prove the better results for boys. We mainly proved almost no difference, but the girls achieved better results. In the level of development of map interpreation skill even girls gained significantly better than boys.

These results are the pretes part of author's dissertation thesis. The main aim was to test the geographical framework and to find whether it is reliable to we could use it in the main research. Other results were chosed because gender and grade are two the most often used variables in relation to the map skills. We were mainly interested in the presumption that women has worse ability to work with maps than man. Our results however did not prove it. There is also many other possibilities how to deal with map skills and its level of development. We are going to focuse on some of them in the main research.

REFERENCES

[1] BEDNARZ, S. W. (2004). US World Geography Textbooks: Their Role in Education Reform. *International Research in Geography and Environmental Education, 13*(3). 223-238.

[2] BOARDMAN, D. (1989). The Development of Graphicacy: Children's Understanding of Maps. *Geography*, *74*(4), 321 -331.

[3] GILMARTIN, P. P., & Patton, J. C. (1984). Comparing the Sexes on Spatial Abilities: Map-Use Skills. *Annals of the Association of American Geographers*, *74*(4), 605–619.

[4] GLÜCK, J. (2001). Die Entwicklung des Landkartenverständnisses bei Kindern: Forschungsstand, methodische, Überlegungen und ein neuer Unterschungsansatz. *Psychologie in Erziehung und Unterricht*, 48, 298–313.

[5] KIMMERLING, A. J., et al. (2009). *Map Use: Reading and Analysis*. Redlands: ESRI Press.

[6] MRÁZKOVÁ, K. (2010). Kartografické dovednosti v RVP ZV a amerických standardech geografického vzdělávání. In V. Najvarová, P. Knecht (Eds.), *Bulletin Institutu výzkumu školního vzdělávání PdF MU 2010* (pp. 54-58). Brno: Masarykova univerzita.

[7] PIAGET, J., & INHELDER, B. (1971). *The Child's Conception of Space*. London: Routledge & Kegan Paul.

[8] POSTIGO, Y., & POZO, J. I. (2004). On the Road to Graphicacy: The Learning of Graphical Representation Systems. *Educational Psychology*, *24*(5), 623–644.

[9] PRAVDA, J. (2003). *Mapový jazyk*. Bratislava: Vydavatelstvo UK.

[10] PRESSON, C. C. (1982). The Development of Map-reading Skills. *Child Development*, *53*(1), 196–199.

[11] RIDING, R. J., & BOARMAN, D. (1983). The Relationship Between Sex and Learning Style and Graphicacy in 14-Year-Old-Children. *Educational Review*, *35*(1), 69–79.

[12] VAN DER SCHEE, J. A. (1987). *Kijp op kaarten* (Disertační práce). Amsterdam: Vrije Universiteit.

[13] VAN DER ZIJPP, T. (1996). *Het trainen van Kaartvaardigheden* (Disertační práce). Amsterdam: Vrije Universiteit.

[14] VAN DIJK, H. (1998). *Kaarten Kiezen* (Disertační práce). Amsterdam: Vrije Universiteit.

[15] WIEGAND, P. (2006). *Learning and Teaching with Maps*. Abingdon: Routledge.

[16] WIEGAND, P. (2004). Maps and Supermaps. In: A. Kent, E. Rawling, & A: Robinson (Eds.), *Geographical Education, Expanding Horizons in Shrinking World* (pp. 152–158). Glasgow: ICA/IGU.

[17] WIGGLESWORTH, J. C. (2003). What Is the Best Route? Route - Finding Strategies of Middle School Students Using GIS. *Journal of Geography*, *102*(6), 282-291.

Úroveň osvojení kartografických dovedností žáků

Mapy patří k nejpoužívanějším pomůckám ve výuce geografie. Učitelé pomocí nich ukazují žákům vzdálená a neznámá místa na Zemi. Mapy ale neslouží jen k vyhledávání měst, států nebo řek, jsou cenným zdrojem mnoha informací. Aby mohli žáci tyto informace z mapy zjistit, musí mít osvojené kartografické dovednosti – čtení, analyzování a interpretování map.

Předkládaný text představuje výsledky předvýzkumu zaměřeného na zjištění úrovně osvojení kartografických dovedností u žáků základních škol. Výzkumným nástrojem je didaktický test tvořený učebními úlohami zaměřenými na testování úrovně osvojení kartografických dovedností. Jednotlivé učební úlohy přesně reflektují kartografické dovednosti vymezené v modelu kartografických dovedností. Výsledky převýzkumu ukázaly významný vliv navštěvované třídy na úroveň osvojení kartografických dovedností, vliv pohlaví prokázán nebyl.

GEOGRAPHY AND GEOINFORMATICS: Challenge for Practise and Education

Edited by: RNDr. Hana SVOBODOVÁ, Ph.D.

Published by Masarykova univerzita 2012

1st edition

120 copies

Print: Amaprint – Kerndl, s. r. o., Pražská 343/20, 674 01 Třebíč-Borovina

ISBN 978-80-210-5799-9

ISBN 978-80-210-5799-9

muni
PRESS